

ANNALS OF MEDICAL HISTORY

PUBLISHED QUARTERLY

VOLUME IX, No. 2

JUNE, 1927

SERIAL No. 34

EDITOR

FRANCIS R. PACKARD, M.D., PHILADELPHIA, PA.

ASSOCIATE EDITORS

HORACE MANCHESTER BROWN, M.D.	Milwaukee
HARVEY CUSHING, M.D.	Boston
CHARLES L. DANA, M.D.	New York
GEORGE DOCK, M.D.	Pasadena
FIELDING H. GARRISON, M.D.	Washington
HENRY BARTON JACOBS, M.D.	Baltimore
HOWARD A. KELLY, M.D.	Baltimore
ARNOLD C. KLEBS, M.D.	Nyon
SAMUEL W. LAMBERT, M.D.	New York
THOMAS McCRAE, M.D.	Philadelphia
LEWIS STEPHEN PILCHER, M.D.	Brooklyn
SIR D'ARCY POWER, K.B.E., F.R.C.S. (ENG.), F.S.A.	London
DAVID RIESMAN, M.D.	Philadelphia
SIR HUMPHRY ROLLESTON, BART., K.C.B., M.D.	Cambridge
JOHN RUHRÄH, M.D.	Baltimore
CHARLES SINGER, M.D.	Oxford
EDWARD C. STREETER, M.D.	Boston
CASEY A. WOOD, M.D.	Chicago

SUMMER NUMBER

NEW YORK.

PAUL B. HOEBER, INC., PUBLISHERS
SEVENTY-SIX FIFTH AVENUE

ANNALS OF MEDICAL HISTORY

VOLUME IX, No. 2

JUNE, 1927

SERIAL No. 34

CONTENTS

	PAGE
PORTRAIT OF NICHOLAS CULPEPER	Cover
PORTRAIT OF ST. FRANCIS OF ASSISI	Frontispiece
THE STIGMATA OF ST. FRANCIS OF ASSISI E. B. KRUMBHAAR.	111
PETER MERE LATHAM R. T. WILLIAMSON	120
WILLIAM SHARPEY JOHN C. BROUGHER	124
LAËNNEC AND CULPEPER AS DEPICTED BY KIPLING LOUIS J. BRAGMAN	129
GALEN'S STUDIES AT THE ALEXANDRIAN SCHOOL JOSEPH WALSH	132
THE EVOLUTION OF THE THOUGHT OF ARISTOTLE JONATHAN WRIGHT	144
DEFENSE REACTIONS DURING THE BLACK DEATH OF 1348-1349 STEPHEN D'IRSAY	169
COPHO'S "ANATOMIA PORCI" LE ROY CRUMMER	180
SOME MEDICAL WORDS IN JOHNSON'S DICTIONARY CHARLES W. BURR	183
GOLDONI, CLINICAL DRAMATIST FREDERICK EBERSON	190
EDITORIAL	195
BENJAMIN WATERHOUSE, AMERICAN PIONEER.	
BOOK REVIEWS	197

DELint: ATLAS OF THE HISTORY OF MEDICINE. ANATOMY; NEUBURGER: HISTORY OF MEDICINE, VOL II, PART I; GARRISON: ESSAYS IN THE HISTORY OF MEDICINE BY KARL SUDHOFF, M.D.; CUSHING AND STREETER: JOANNES BAPTISTA CANANO, 1515-1578; GIROLAMO DA CARPI, 1501-1556; MUSCULORUM HUMANI, CORPORIS PICTURATA DISSECTION (FERRARA, 1541); FOX: REMINISCENCES; VAUGHN: A DOCTOR'S MEMOIRS; KRUSEMAN: A MEDICAL ART CALENDAR FOR THE YEAR 1927; COLLINS: THE DOCTOR LOOKS AT LOVE AND LIFE.

Original articles are published only with the understanding that they are contributed exclusively to the ANNALS OF MEDICAL HISTORY. Manuscripts offered for publication, books for review, and all correspondence relating to the editorial management should be addressed to the Editor, Dr. FRANCIS R. PACKARD, 302 South 19th Street, Philadelphia, Pa.

Communications regarding subscriptions, reprints, and all matters regarding the business management of the ANNALS OF MEDICAL HISTORY should be addressed to the publishers, PAUL B. HOEBER, INC., 76 Fifth Avenue, New York City.

The ANNALS OF MEDICAL HISTORY is published quarterly, the four issues comprising one volume. No advertising is carried. The subscription price is \$8.00 a year. Single numbers, as far as available, \$2.50 per copy. A few sets of Vols. I, II, III, IV, V, VI, VII and VIII are available in parts as published at \$8.00 per volume; \$10.50 per volume, bound in cloth.

Entered as second-class matter, June 2, 1917, at the Post Office, New York, N. Y., under the Act of March 3, 1879.
Copyright, 1927, by Paul B. Hoeber, Inc.

Y

34

GE

ver

ce

II

20

24

29

32

44

69

80

83

90

95

97

OF

cial

LS

g is

II,

Frontispiece
Annals of Medical History
Summer 1927



ST. FRANCIS OF ASSISI



[Headband and Initial from Crooke: *A Description of the Body of Man*. London, 1631.]

ANNALS OF MEDICAL HISTORY

VOLUME IX

SUMMER, 1927

NUMBER 2

THE STIGMATA OF ST. FRANCIS OF ASSISI*

By E. B. KRUMBHAAR, M.D.

PHILADELPHIA, PA.



THE seven hundredth anniversary of the death of St. Francis of Assisi, which occurred on the 3rd of October, 1926, brings vividly before us not only one of the most remarkable figures of historic times, whose spiritual influence on millions has been incalculably great for many centuries and still continues, but also one of the most striking and best attested "miracles" that include marked changes in the human body, of which the Christian world is aware.

We cannot pause here to discuss the tremendous nature of the stimulus and the intense mental make-up which transformed the swashbuckling young Assisan reveller from a typical product of his day into the most Christ-like figure that has appeared in

nineteen centuries; but these must certainly be taken strongly into account in any consideration of the famous stigmata. Neither can we more than mention that strange combination of poverty and asceticism (Brother Ass the body) with mysticism and joyousness (the Jongleur of God) which made up St. Francis' life after his conversion and helps us today in any effort to comprehend the nature of stigmata. The great order of the Franciscans or Friars Minor, which was founded for St. Francis by Innocent iii in 1209, already by 1220 had developed along such different lines than he had anticipated that he resigned the office of minister general and gladly retired to his more appropriate life of saintly example, another incident that throws light on the make-up of the man.

Two years before his death, St. Francis went with Brothers Masseo, Angelo and Leo to the Mt. Alverna (also called Monte della Vernia or La Verna) in the neighboring Apennines near Arezzo, a mountain that had been given to the order as a retreat by Orlando, Count of Chiusi in 1213. It is known that at this time Francis was much

* From the Laboratories of the Philadelphia General Hospital. Read before the Section on Medical History of the College of Physicians, Oct. 28, 1926.

concerned over the future of the order and his own inability to guide it along the lines he had mapped out; he "was even more absorbed than usual in his ardent desire to suffer for Jesus and with him." After a "Lent" of forty days, spent almost entirely in fasting, prayer and meditation on his favorite subject, the Crucifixion, and in great bodily weakness and exhaustion, he had a vision on the morning of September 14, 1224, which Sabatier describes as follows:

Jesus Christ, the Crucified, the which had shown himself to him in the likeness of a seraph; and thus his hands and feet appeared to be pierced through the middle with nails and the heads of them were in the palms of his hands and the soles of his feet outside the flesh and their points came out on the back of his hands and feet, so that they seemed bent back and riveted in such fashion that under the bend and riveting which all stood out above the flesh, might easily be put a finger of the hand, as in a ring, and the heads of the nails were round and black.



VIEW OF THE PORTIUNCULA AND ASSISI, AS IT WAS IN THE TIME OF ST. FRANCIS.

In the rays of the rising sun . . . he suddenly perceived a strange figure. A seraph with outspread wings flew towards him from the edge of the horizon and bathed his soul in raptures unutterable. In the centre of the vision appeared a cross and the seraph was nailed upon it. When the vision disappeared he felt sharp sufferings mingling with the ecstasy of the first moments. Stirred to the very depths of his being, he was anxiously seeking the meaning of it all, when he perceived on his body the "Stigmata¹ of the Crucified."

In the language of the Fioretti:

Straightway in the hands and feet of St. Francis began to appear the marks of the nails, in such wise as he had seen them in the body of

¹ *στigmata* means a spot or mark, but is used in medicine to designate a variety of marks, e. g., stigmata of degeneration.

Likewise in the right side appeared an image of a wound made by a lance, unhealed and red and bleeding, which afterwards oft-times dropped blood from the sacred breast of St. Francis and stained with blood his tunic and hose.

In the account also of Thomas of Celano, the saint's first biographer (1228), he is pictured as considering anxiously what the vision might mean: "And when he could find nothing by which it might be understood and the novelty of the vision overwhelmed his heart, there began to appear [*Coeperunt apparere signa clavorum*] in his hands and feet signs of nails such as he had just seen in the holy Crucified One who stood over him." Bonaventura² (1263) also

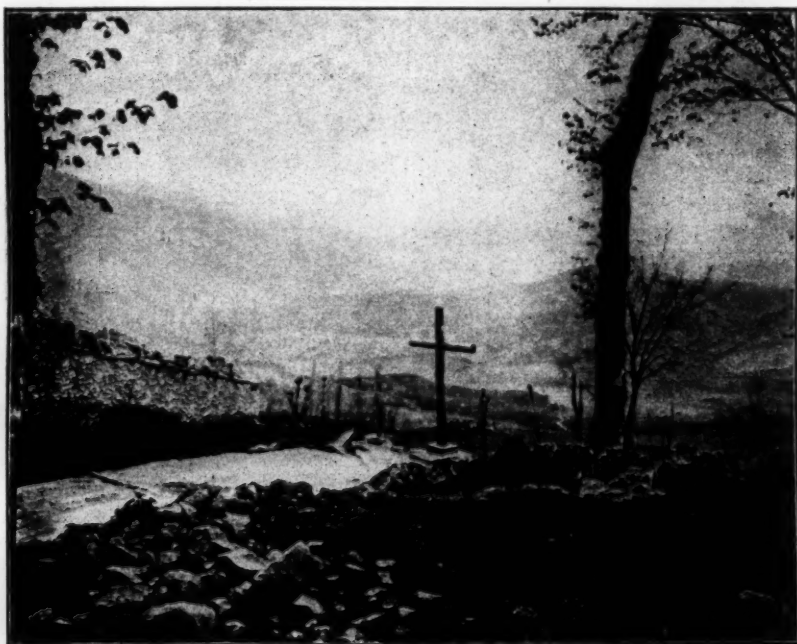
² From *Vita Sancti Francisci* of Saint Bonaventura: "Manus enim et pedes in ipso medio clavis confixae videbantur, clavorum capitibus in interiore

uses the expression "began to appear" and the Three Companions (1246) tell the story almost in the same words. Though all but the earliest account may well have been borrowed from its predecessor, still it is apparent that it was not considered that the stigmata sprang miraculously into full-fledged existence.

Francis seldom if ever referred to this stupendous occurrence. According to Bonaventura, a small child at the time of the

panions (Leo, Ruffino, Angelo, Elias) bore prompt witness that the stigmata existed and that they were seen by many after his death, but none actually says: "I have seen them myself."

The day after St. Francis' death, Elias of Cortona, the acting superior of the order, wrote a circular letter in which it is clearly implied that he had himself seen the stigmata. Bonaventura says that the Saint's friend, Pope Alexander IV, had seen the



THE SUMMIT OF MT. ALVERNA, ON WHICH ST. FRANCIS RECEIVED THE STIGMATA.

occurrence and writing some forty years later, Francis after returning to the Portiuncula, related the occurrence to his companions in response to their earnest requests, but this was apparently the only time that he did so and this rests on the authority of Bonaventura alone. Several of Francis' com-

parte manuum et superiore pedum apparentibus et eorum acuminibus existentibus ex adverso. Erantque clavorum capita in manibus et pedibus rotunda et nigra—ipsa vero acumina oblonga retorta et quasi reperculsa, quae de ipsa carne surgentia carnem reliquam excedebant. Dextrum quoque latus quasi lancea transfixum rubra cicatrice obductum erat, quod saepe sanguinem sacrum effundens, tunicam et femoralia resperebant." (XIII.)

mysterious wounds. Ruffino was said to have touched the wound in the side, but nowhere does this appear in his own writing. In the two years of St. Francis' life following the stigmatization his mode of existence was greatly changed. It is said that he wore his sleeves long to conceal the marks on his hands (how different from some of his modern imitators!) and was no longer able to walk in comfort on account of the marks on his soles. However, he never again mentioned them to his friends and there is no detailed description of their appearance after his death.

The stigmata thus seem, without being actually proved, to be sufficiently well docu-

mented with contemporary evidence to admit of but little doubt but that on that historic morning St. Francis acquired certain marks on his hands, feet and side more or less resembling the stigmata of Christ's crucifixion, which stayed with him till his death two years later. The story is cer-

To have the incident brought home even more closely, a modern doubting Thomas should visit the treasury of the Church at Assisi and see as I have what is asserted to be the actual parchment used to cover the "wound in his side," worn through in its center and still bearing the signs of the ser-



CONTEMPORARY PORTRAIT OF BROTHER FRANCIS BEFORE RECEIVING THE STIGMATA.

tainly not a "late legendary accretion," as Chesterton³ has pointed out, and few will be found to agree with a cynical suggestion that has been made that St. Francis having been worsted in a fight with his friend Dómenico di Gusman, his followers invented the story to mask the signs of the conflict.

³ Chesterton, G. K. *Saint Francis of Assisi*. Lond., 1924.



THIRTEENTH CENTURY PORTRAIT OF ST. FRANCIS WITH THE STIGMATA (MARGARITONE?).

ous exudate and also the contemporary attestation of his favorite disciple, Brother Leo, who is said to have removed the parchment from the Saint's dead body. The accompanying illustration of this document, in his and St. Francis' handwriting, was found on Brother Leo's body after his death. Kept ever since in the same treasury, these small parchments bridge the gap of seven centuries and bring one marvelously close to those soul-stirring events. In Brother Leo's handwriting in red ink is written in Latin:

The Blessed Francis two years before his death kept a forty day fast in the Alverna in honor of the blessed Virgin Mary, Mother of God, and of the Blessed Michael the Archangel, from the Assumption of the blessed Virgin Mary to the feast of St. Michael in September; and

the hand of the Lord was laid upon him. After the vision and speech he had with the seraph and the impression of Christ's stigmata on his body, he made these praises which are written below on the sheet, and he wrote them with his own hand, giving thanks to God for the favor that had been conferred upon him [in Francis' handwriting], "The Lord bless thee and guard thee. Show his face to thee and have mercy upon thee—turn his face to thee and give thee peace."

And the blessed Francis wrote with his own hand this blessing for me, Brother Leo [again in Francis' handwriting]: "The Lord bless thee, Brother Leo."

And in the same way, he made the sign T together with the head with his own hand.

The marks on the hands and feet of St. Francis were apparently dark fleshy excrescences on both dorsal and palmar surfaces, resembling the flattened head of the nail on the palmar side. It is said that St. Clara, for whom Francis founded the "Second Order" of Franciscans, the nuns called the "Clares," tried after his death to remove one of the stigmata as a memento of her friend, but that it was firmly attached to the surrounding tissue. The wound in the side, corresponding to Christ's wound on the cross, constantly exuded a small amount of serous fluid, as the worn parchment covering at Assisi bears mute but eloquent witness.

Extensive though the evidence for the stigmata is, when one considers it over a space of seven centuries, nevertheless it is entirely inadequate as a basis for a pathological diagnosis, even if medical knowledge were sufficiently advanced today to give a complete answer in the presence of adequate data. It would seem that such a phenomenon must be either (1) a miracle; (2) artificially produced; or (3) a natural pathological lesion. If miraculous, and it is to be noted that even the Roman Catholic Church does not make belief in the stigmata an article of faith, it is then beyond the field of scientific inquiry and need not detain us here. In regard to the second possibility, as previously indicated, there is strong evidence that some physical change occurred in

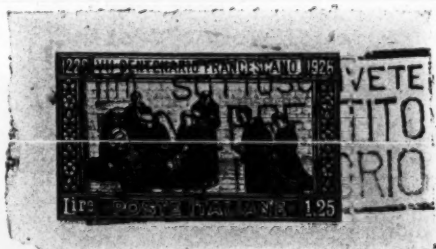
St. Francis' hands, feet and side after he had had his vision and that he tried to keep his secret to himself, not exploit it. The chief argument in favor of pious fraud seems to be the belief that such an event is otherwise an impossibility; just as the cure of the advanced paretic is impossible, in the words



BROTHER LEO'S PARCHMENT IN HIS AND ST. FRANCIS' HAND-WRITING.

of one sceptic who wrote on this subject. And yet we are today, apparently, seeing the cure of paresis and even greater wonders accomplished by scientific medicine. As Voltaire, I think, put it, the miracles of today are the commonplaces of tomorrow; or in Chestertonian paradox: "A man in Voltaire's time did not know what miracle he would next have to throw up. A man in our time does not know what miracle he will next have to swallow." On the other hand, pious frauds were not unknown in the history of the Church of that time, when all religious matters were on a very different plane than they are today. One has only to read the same Franciscan authorities who gave the accounts of the stigmata to meet certain narrations which must be explained on the first or second of our three theories. In the later "stigmatized," fraud is usually

prominent, either as a pure imposture to gain notoriety, or as the characteristic accompaniment of the hysterical nature which must underlie such phenomena, even if found to have a "natural" origin. St. Francis was undoubtedly highly emotional and neurotic, perhaps even hysteric, and his companions so emotionally saturated with the new idea that they might be expected to see events in a highly colored light. But the verdict of History is, I think



POSTAGE STAMP RECENTLY ISSUED BY THE ITALIAN GOVERNMENT COMMEMORATING THE FRANCISCAN ANNIVERSARY. NOTE THE STIGMATA, INCLUDING AN INDICATION OF THE WOUND ON THE RIGHT SIDE. LIKE THE FRENCH PASTEUR ISSUE AND OTHERS, THIS IS AN INTERESTING EXAMPLE OF THE RECENT TENDENCY TO UTILIZE PHILATELY AS A MEANS OF EDUCATING THE PUBLIC IN MATTERS OF HISTORICAL AND SCIENTIFIC INTEREST.

rightly, definitely against either him or his intimates being considered wilful impostors.⁴

We are thus brought to the consideration of the stigmata as possibly natural pathological phenomena. Certainly most unusual ones, just as the history of stigmatization includes very few if any authentic cases, and none recorded in the preceding twelve centuries of the Christian era. But who dare brand them as absolutely impossible, even without invoking miraculous supervention? We are in almost total ignorance of the limitations of the power of mind over body (a reason perhaps for the exuberant growth of a certain therapeutico-religious sect of

our own generation) and yet few will deny that some such power exists. Skin vesicles are said to have been produced by the unaided power of suggestion during hypnosis, and even on one occasion a bloody exudate from a previous dermatographia in the same state.⁵ It requires but a slight extension, therefore, if such reports are true, to include autogenous production of similar phenomena. Granted the production of blebs in given localities, following intense mental stimuli, probably as a result of vasomotor changes, it becomes less difficult to add to this concept a bloody effusion in specified areas, or in the case of fleshy protuberances, such as St. Francis' seemed to be, a hyperkeratosis or even a pigmented nevus or papilloma, which as it grew older and darker might easily simulate a nail. Rosenow has claimed even more minute localization in the elective affinities of bacteria and Maud Slye similar refinements in spontaneous tumor formation. Cutaneous horns, of extensive distribution and varieties are far from uncommon⁶ and while the etiology of such conditions is largely unknown, it is by no means improbable that neurotrophic influences, and these perhaps partly regulated by the mind, may play an important rôle. It is significant that the early descriptions speak of the stigmata of St. Francis as "beginning to appear," i.e. it was not believed that they instantaneously sprang full-formed into being, which would constitute an occurrence much more difficult for the ordinary mind to comprehend.

Following the stigmatization of St. Francis, other examples soon became numerous. Dr. Imbert Goubeyre,⁷ a most credulous individual, has collected 145 cases of

⁴ At the meeting at which this paper was presented Dr. C. W. Burr made the interesting suggestion that St. Francis in a spirit of self-castigation, but with no desire to defraud or to exalt himself over his fellows, may have inflicted the wounds upon himself in imitation of Christ's stigmata and that only after his death did the legend grow of their supernatural origin. His secretive attitude toward his stigmata would be quite in keeping with such an explanation.

⁵ Bourru, H., and Burot, P. Hemorrhagie de la peau provoquée par la suggestion en somnambulisme. *Compt. rend. Soc. de biol., Par.*, 1885, 8s., 11, 461.

⁶ Gould, G. M., and Pyle, W. L. Anomalies and Curiosities of Medicine. Phila., 1897, pp. 226, 286, 338.

⁷ Goubeyre I. Les Stigmatisées. *Par.*, 1873, 1, 268, La Stigmatisation, l'extase divine et les miracles de Lourdes. *Par.*, 1894.

persons who had received the stigmata, eight of whom he said were living at the time he wrote. Alexander Macalister,⁸ professor of anatomy in the University of Cambridge, in his article on stigmatization in the eleventh edition of the *Encyclopedia Britannica* enumerates ninety instances (eighteen males, seventy-two females) and about thirty more, of which there are no particulars recorded. The earliest of these was apparently Ida of Louvain (1300), on whom the marks appeared as colored circles, and soon after Gertrude von Oosten of Delft (1344, colored scars). The greatest variety was encountered: Some had all five of the classical marks (full stigmatization), others but one or two. Some had open wounds, others merely bloody exudates in the classical spots, occasionally varied with the forehead (from the crown of thorns) and in one case at least (Angela della Pace, 1634, fully stigmatized at nine) with the sponge and hyssop in the mouth (a benign neoplasm? lymphedema?). The wounds were sometimes fetid and some "emitted the odor of violets!"

A second group, more obviously neurotic, felt the pains of stigmatization, but did not exhibit any of the physical signs. A third group, from the earlier post-Franciscan centuries, where the stigmata were said to have been found on the heart without bodily surface markings, might perhaps be better considered as misguided interpretations of pathological lesions at a period when very little was known of morbid anatomy.

Although it would be tiresome and relatively useless to discuss these cases in detail, a few perhaps merit some further attention.⁹ One of the most famous is Saint Catherine of Siena, the youngest of twenty-five children and one of twins, the other of which

was stillborn. She was an ascetic and ecstatic from the age of seven, saw visions and in her seventeenth year took the habit of the Dominican tertiaries. In a post-communion ecstasy on the fourth Sunday in Lent, 1475, she received the full stigmata, but in response to her prayer for the sake of humility the marks were not made visible! It is hardly surprising then, especially in view of the intense rivalry between the Dominicans and Franciscans, that her stigmata were not universally recognized and that Franciscans especially were loath to see their Saint share his chief glory with one of a rival order. Termination of the discussions required bulls from two Popes (Sixtus IV and Innocent VIII), according to which representation of the stigmata in all pictures of St. Catherine and any expression of belief in them was absolutely forbidden.

The case that has excited the most interest and study in modern times is that of Louise Lateau, a Belgian peasant girl, born January 30, 1850, of poverty-stricken parents. She was chlorotic, did not menstruate till eighteen, was a recluse and soon became an ecstatic and saw visions. In March, 1868, she began to bleed from the mouth and the next month seemed so sick that on April 15 the last sacrament was given. Menses, however, were established on April 19, and two days later she was able to take a long walk to church. The stigmata began to appear on Friday, April 24, 1868, with bleeding from the left side of her chest, and thereafter reappeared every Friday for several years. On the second Friday blood exuded from the dorsal surfaces of both feet, in addition to that from the wound in the side; on the third from both dorsal and palmar surfaces of both hands as well. This continued regularly every week with other additions, such as the forehead and between the shoulders, and was estimated to amount to about 250 gms. per week. Warlomont,¹⁰ who was commissioned by the Royal Academy of Medicine of Belgium to make a

⁸ Macalister, A. Stigmatization. *Encyclopedia Britannica*, Ed. 11.

⁹ The cases of Christine de Stumbele, Veronica Giuliani, Vitaline Gagnon, Palma d'Oria, Maria K. and Louise Lateau are narrated in some detail in Hammond, W. A. *Nervous Derangement*. N. Y., 1883, p. 154, Chapter on Stigmatization.

¹⁰ Warlomont. Louise Lateau, *Rapport Médicale*, etc. Bruxelles and Paris, 1875.

scientific investigation of the case, after careful observation and taking measures to prevent artificial production of the hemorrhages, was convinced that the weekly stigmatization and ecstasy (hystero-catalepsy) were both real; though other claims made by the girl, such as that she had not slept, drunk, or eaten for four years, and had no passage of urine or feces for over three, were proved to be false and fraudulently supported by her. The combination in an hysteric of true pathological signs with fraudulent attempts to augment them with simulated phenomena is by no means impossible and should not necessarily lead the searcher for the true state of the matter into denouncing the whole occurrence as fraudulent. Fraud in some features, however, cannot but suggest that the whole business may be fraudulent and there is some evidence that such was the case here.¹¹ For instance, though hemorrhages continued even when the hands were bandaged, paper lining the bandages was said to reveal numerous pinpricks. In the debate that followed Warlomont's report, adherents were found both for the miraculous and the natural pathological viewpoints; but the Academy perhaps wisely decided to leave the matter undecided.

A very recent occurrence, studied by Professor Bianchi,¹² offers an interesting comparison to the Franciscan story. In a young girl, aged twenty-eight, from Cosenza (Montalto Offugo), periodic sanguineous sweats and "stigmata" were observed to appear every Friday in March from 1923 on! Careful study has convinced Fabrizio and Turano and others who have seen this case that these phenomena were not "faked" and that the subject was other-

wise perfectly normal. They believed, however, that it was not a case of true hemidrosis but rather of a hemorrhagic exudate due to some condition such as angioneurotic edema, and that the stigmata, which appeared on the dorsal and plantar surfaces of the feet and the anterior surfaces of the elbow, were due to trophic and vasomotor disturbances. I have not been able to see the original descriptions to find the exact nature of these lesions. Even with the little that we know of the mimicking capacity of angioneurotic edema and other neurotrophic disorders, such an explanation (explaining little though it does), should as I have previously indicated, not be rejected as incomprehensible. In the case of Padre Pio of Foggia, an "exceptionally calm and composed individual," who is still living and has a good family and past medical history, Professor Bignami,¹³ an agnostic, did not consider that the superficial scars on the hands and feet and the form of a cross on the left breast were artificially produced. He thought it possible to account for them naturally, as due to necrosis of the epithelium of neurotic origin, probably attributable to unconscious suggestion.

It will be interesting to see whether the solemn celebrations attending St. Francis' anniversary may perhaps cause a sufficient stimulus to some religious devotee to produce similar phenomena that can perhaps be studied from the start in such an intensive and objective manner that more light can be thrown on the nature of the occurrence.

In the meantime, we, like the Belgian Academy, should leave the matter undecided. My own preference is to feel that lesions which might fairly be called stigmata of the crucifixion are not beyond the realms of pathological possibility; and that in some cases, including that of St. Francis, the evidence, while not enough to constitute actual proof, is sufficient to impress strongly the unbiased student.

¹³ Quoted by H. Thurston, S. J., *The Month*, 1923, pp. 142, 97.

¹¹ Boens, H. *Fin de la Comédie de Boisd' Haine*. Bruxelles, 1876; *Louise Lateau ou les Mystères de Bois d'Haine dévoilés*. Bruxelles, 1875. Boens first considered that the stigmata were the natural hemorrhages of a hemophilic.

¹² Bianchi. *Congr. degli Alienisti*, Trieste, Sept., 1925. Quoted by Del Gaudio, A. *Le Stimmate di S. Francesco d'Assisi*. *Ref. Med.*, Naples, 1926, xli, 252.

BIBLIOGRAPHY

- BIHL, M. Die Stigmate des heiligen D. Franziskus Von Assisi. *Histor. Jabrb. des Goetbes Gesellsch.*, xxviii.
- BOURNET, A. S. François d'Assise. Étude sociale et médicale. Lyon, 1893, Par., 1895.
- CALAMITA, F. P. La Persona di San Francesco d'Assisi. Note di antropologia. Bitonto, 1912.
- DE COQUIN, J. Étude Critique sur les Stigmates de Saint François. In *Études franciscanes*. II.
- COTELLE, T. St. François d'Assisi. Étude Médicale. Par., 1865.
- FABRIZIO, A., and TURANO, A. *Rinascenza Med.*, 1925.
- GEMELLI, F. A. Le Stimmate di S. Francisco nel giudizio della Scienza. *Vita e. Pensiero*, Aug., 1924.
- GORRES. La Mystique Divine, Naturelle et Diabolique. Par., 1861.
- LEMONNIR. Les Stigmates de St. François. In *Études franciscanes*. cxii.
- MERKT, J. Die Wundmale des heiligen Franziskus von Assisi. Leipzig, 1910.
- O'MALLEY, A., and WALSH, J. J. Essays in Pastoral Medicine. N. Y., 1906. Appendix on Bloody Sweat.
- PETRARCH, F. Vita Solitaria, III, Chap. 1. Epistole Senili, III.
- PORTIGLIOTTI, G. San Francesco d'Assisi e la epidemie mistiche del medio-evo-Palermo.
- RENAN, A. Nouvelles études d'histoire religieuse.
- SABATIER, Vie de Saint François d'Assise. Appendix.
- TAMASSIA, N. San Francisco d'Assisi e la sua leggenda. Padua, 1906.



PETER MERE LATHAM

By R. T. WILLIAMSON, M.D.

LONDON, ENGLAND

IN the middle of the last century Dr. Peter Mere Latham occupied a high position in the medical profession in England. He was one of the earliest English advocates of auscultation; and from his excellent work on heart diseases he was often spoken of as "Heart" Latham. This served to distinguish him from his father, Dr. John Latham, who was president of the Royal College of Physicians from 1813 to 1819.

To Peter Mere Latham we are indebted for many valuable contributions to medical literature, and for two volumes of clinical lectures, which will always rank amongst the best clinical lectures of the past. They are still instructive reading, as medical literature of historical interest; but especially valuable are his remarks on medical education. The dangers which he recognised nearly one hundred years ago are greater in our own times; and hence his remarks are worthy of the careful consideration of medical teachers and examiners today. Peter Mere Latham came of a distinguished Cheshire family. His grandfather was the Rev. John Latham of Siddington, Cheshire. His father was Dr. John Latham who occupied a high position in the medical profession in London in the early part of last century, and became president of the Royal College of Physicians.

Dr. John Latham recognised the difference between diabetes insipidus and diabetes mellitus, and wrote several books on clinical medicine. He was physician to St. Bartholomew's Hospital; and there, he tells us, he spent "the best part of his days very happily in an humble attempt to be useful." At the end of life he retired to his country residence near Sandbach in Cheshire, and there he died in 1843. In the Sandbach Church is a tablet to his memory. Of him it was said that: "He was singularly

temperate when temperance was hardly yet thought to be a virtue, he was most pure in life and conversation when to have been otherwise would have provoked no censure. He was not ashamed to be religious when religion had yet no recommendation or countenance from the world."

Peter Mere Latham was Dr. John Latham's second son. His mother was Mary, daughter of Peter Mere, vicar of Prestbury, Cheshire (a quaint, interesting, old Cheshire village).

Peter Mere Latham was born in 1789. He was educated first at Sandbach in Cheshire, and later at the Macclesfield Grammar School. As a schoolboy he is said to have hated Latin and Greek, but he must have paid great attention to these subjects later, for he gained the undergraduate's prize for Latin verse at Oxford, and he had a good knowledge of Greek and read the Greek New Testament up to the end of life. He entered as a student at Brazenose College, Oxford, in 1807 and obtained the B.A. degree in 1810, and the M.A. in 1813. He studied medicine at St. Bartholomew's Hospital, and obtained the M.B. in 1814, and the M.D. (Oxford) in 1818; the same year he became a Fellow of the College of Physicians. In 1815 he was appointed physician to the Middlesex Hospital and physician to St. Bartholomew's Hospital in 1824. Shortly before leaving the Middlesex Hospital Latham was associated with Dr. Roget in investigating an epidemic disease in the General Penitentiary at Millbank. Of this epidemic he wrote a detailed account. Whatever may have been the exact nature of the disease, we are informed that it was cured apparently by mercury.

Dr. Latham was associated with Dr. Southey in delivering lectures on the practice of physic for four years (1816-1820).

In 1836 he published his book entitled

"Lectures on Subjects Connected with Clinical Medicine." In these lectures he strongly advocated the practice of auscultation which had been so enthusiastically introduced by Laënnec in France. Laënnec had worked out his great system of auscultation at the Necker Hospital, Paris, about the time when Latham was physician to the Middlesex Hospital, and great attention was paid to the use of the stethoscope and to Laënnec's work at this period, both in England and on the Continent. In his "Clinical Lectures on Diseases of the Heart," Latham gives us a careful account of the progress of cardiac auscultation up to 1836, and records his own experiences and opinions as to its value and limitations. He substituted English terms for those used by Laënnec, and did much to introduce auscultation into English medical practice.

These lectures are full of valuable clinical observations and are still deeply interesting reading. Especially valuable are his lectures on angina pectoris.

Latham's lectures will always rank amongst the best of English clinical lectures of the past. The excellent work which he did on cardiac diseases, and his high reputation as an author on these affections caused him to be spoken of as "Heart" Latham.

But his lectures and writing will probably be of most interest to medical men today on account of his remarks on medical education. His view of the spirit in which medical study and work should be carried out will hold good up to the end of time, and is given in beautiful and impressive language. After pointing out in his lectures to his students that the *diseased human body* will be their study and care, he proceeds:

And is it possible to feel an interest in all this? Ay, indeed it is; a greater, far greater interest than ever painter or sculptor took in the form and beauties of its health.

Whence comes this interest? At first, perhaps, it seldom comes naturally: a mere sense of duty must engender it; and still, for a while,

a mere sense of duty must keep it alive. Presently the quick, curious, restless spirit of science enlivens it; and, then it becomes an excitement and a pleasure, and then the deliberate choice of the mind.

When the interest of attending the sick has reached this point, there arises from it, or has already arisen, a ready discernment of diseases, with a skill in the use of remedies. And the skill may exalt the interest, and the interest may improve the skill, until, in process of time, experience forms the consummate practitioner.

But does the interest of attending the sick necessarily stop here? The question may seem strange. If it has led to the readiest discernment and the highest skill, and formed the consummate practitioner, why need it go further?

But what if humanity shall warm it? Then this interest, this excitement, this intellectual pleasure, is exalted into a principle, and invested with a moral motive, and passes into the heart. What if it be carried still further? What if religion should animate it? Why, then, happy indeed is that man whose mind, whose moral nature, and whose spiritual being, are all harmoniously engaged in the daily business of his life; with whom the same act has become his own happiness, a dispensation of mercy to his fellow-creatures and a worship of God.

Nearly one hundred years ago Latham clearly saw the risk of clinical study in the wards being greatly restricted, or neglected, owing to the large number of subjects to which the medical student had to devote his attention in the limited years of study in the medical curriculum. In our own time this risk is much greater; for though the time of the curriculum is much longer than in the days of Latham, the number of subjects to be studied has increased in much greater proportion.

Latham amusingly points out that excess of knowledge may be a hindrance to the medical man. He remarks:

Knowledge may be an incumbrance as well as a help. Many men know more than they are able to wield. There is a point (I believe) in the acquisition of knowledge (and this point varies infinitely in different individuals), beyond

which, if more be acquired the whole mass becomes useless to its possessor. I am acquainted with men who never have *done*, and never can *do* anything, because they know too much; and I am acquainted with men possessing comparatively small knowledge, so dextrous in its use that they have ridden over the heads of others far, very far, their superiors in acquirements.

With respect to the great risk of clinical work in the wards being neglected and interest therein diminished through the amount of time devoted to lectures and classes on other subjects, Latham remarks: "I have always thought that in our schools every mode of lecturing has been unduly exalted above clinical lecturing; and every place where knowledge is to be had, or is supposed to be had, has been unduly preferred to the bedside; and I continue to think thus."

All this is certainly true today. In our own times, in many medical schools, students find great difficulty in carrying out their duties as clinical clerks, on account of the number of lectures and demonstrations on various subjects, which they attend during the period when they are clerking in the wards. Hence clinical ward work is greatly restricted and interest therein diminished. This restriction is deserving of the careful attention of those who are now controlling the medical students' curriculum. Latham laments that, in his day, students at St. Bartholomew's Hospital generally neglected their splendid opportunities for clinical work in the wards. He tells us, that, at first, students have a dislike for ward work; but when this repugnance is got over they are more interested in surgery than in medicine. He considers the various reasons for this and points out that one is the greater certainty of surgery. Latham admits the uncertainty of medicine; and then in the following impressive language he points out that:

There is nothing absolutely sure but what rests upon the basis of numbers, or falls within the sphere of the senses. Where reasoning

begins, there begins uncertainty; and on this account the highest and best things in the world are all uncertain, and so in our profession. But from this very uncertainty those who practise it successfully claim their greatest honour: for where there is no possibility of error, no praise is due for judgment of what is right.

Latham is a strong advocate of "self teaching" on the part of the students and he urges them to exercise their observation carefully and unremittingly, whilst he regards it as his own duty to demonstrate. He recognises the danger of over-teaching on the part of the physician, and he concludes his remarks on this subject in the following words:

If ever the desire to view the beauties and sublimities of Nature has led you to ascend some lofty eminence, you have probably taken with you one more familiar with the scene than yourselves as a guide; but you have still trusted to your own eyes and your own feelings, to fill you with the delight of the prospect, and tell you what to admire and wonder at; and you have required no more from your guide than to point with his finger and say, "See here, and see there." So in entering this place, even this vast hospital, where there is many a significant, many a wonderful thing, you shall take me along with you, and I will be your guide. But it is by your own eyes, and your own minds, and (may I add) by your own hearts, that you must observe, and learn, and profit: I can only point to the objects, and have little more to say than "See here and see there."

Latham's remarks with respect to pathology and treatment are worth quoting. He regrets that in his own time many of the best physicians have paid so much more attention to pathology and diagnosis than to treatment. He remarks that: "The fact is certain, that to many eminent physicians, of the foreign school especially, to whom speculatively we owe the most, practically we owe the least. Their lessons of pathology and diagnosis are copious, original and instructive; their lessons of treatment are brief, barren, and unprofitable." He laments that any eminent master of pathology "should come at last to the treatment of

disease as a humbler and less worthy portion of the physician's care." He then remarks: "For this ought not to be. Medicine, as it begins to touch upon higher interests, even the interests of life and death, should feel itself in alliance with higher motives than any which can be thought to help and quicken its pursuit as mere science. For now it claims a sort of moral respect in the handling; it calls upon the conscience as well as the intellect."

Owing to the heavy strain of work, Latham's health became impaired, and in 1841 he resigned his post as physician at St. Bartholomew's Hospital. He was then one of the foremost physicians in London, and had been appointed physician extraordinary to Queen Victoria. He continued to contribute to medical literature, but in 1865 he returned to Torquay where he resided until his death in 1875, at the age of eighty-six.

Sir Thomas Watson has given us an account of Latham's happy old age and period of retirement at Torquay. We are told that Latham was a man of strong religious convictions, that he was a "charming companion, full of various information, affluent in anecdote, with a keen sense of fun and humour," and that his life was governed by an imperative sense of duty. His love of order and method are also recorded, and Sir Thomas Watson describes him as an "example of that peculiar English character, the unobtrusive but accomplished and high-minded Christian gentleman."

Certainly he was one of the brightest examples of the English physician of the past.

REFERENCE

LATHAM, P. M. Clinical Lectures, Vol. I and II. Complete works. New Sydenham Society. Containing memoir by Sir Thomas Watson. London, 1876 and 1878.



[From Redi: Opere. Napoli, 1778.]

WILLIAM SHARPEY (1802-1880)*

By JOHN C. BROUGHNER, A.B.

PORTLAND, OREGON

IN England during the eighteenth century physiology was taught by the anatomist, aided by the surgeon in the hospital. Experimental physiology with laboratory equipment for teaching had not yet come into existence. The status was even less encouraging in France and Germany. Italy led the way in the medical sciences still, and the work of her brilliant philosophers continued to be the vanguard for the whole world, as the names of Volta, Galvani, Spallanzani, Scarpa and Morgagni bear witness. Several outstanding contributions to physiology were made by men without physiological laboratories, and primarily interested in other fields of science: Lavoisier in 1777 described the exchange of gases in respiration; Galvani published his essay on animal electricity in 1792; classical experiments by Spallanzani on digestion appeared in 1780, and his posthumously published work on the seat of respiration in 1803; Haller had (1757) conclusively demonstrated irritability of tissues and organized the knowledge of physiology for the first time; Bichat began to lecture on anatomy in 1797, emphasizing the mutual relation of structure and function and verifying his views by experimental study of animals. Thomas Young (1801) described astigmatism, stated the undulatory theory of light and proposed a theory of color vision; Gall (1810) published a treatise on the nervous system; Legallois in 1812 described the action of the vagi on respiration and later located the respiratory center; Magendie (1822) demonstrated that the anterior spinal roots are motor, and the posterior, sensory. Two years later Flourens published his work on cerebral physiology and Prout found hydrochloric acid in gas-

tric juice. These discoveries and contributions were made, for the most part, in the latter part of the eighteenth century and the first quarter of the nineteenth. They indicate that an understanding of body function was edging its way to recognition as a science.

One of the first men to turn his attention to physiology, in the sense of it being a separate science and deserving of a laboratory, was William Sharpey. He was born in the little seacoast town of Arbroath, in eastern Scotland, April 1, 1802. His father was a ship owner, and a native of Folkestone in Kent, having emigrated to Arbroath a few years previously. He died before William was born, and the boy came under the influence of Dr. Arrott. The latter married Mrs. Sharpey, who previous to her marriage to Sharpey was Mary Balfour. Having attended the public schools of Arbroath, William was sent to the University of Edinburgh at the age of fifteen. Here he studied the humanities and natural philosophy. During his second college year he began the study of anatomy under Dr. John Barclay, who then lectured in an extra-academical school. Thus it seems he had decided to study medicine, and in 1821 he obtained the diploma of the Royal College of Surgeons of Edinburgh. The next year he went to London and studied anatomy in the Brooks school. After three months' dissection here he was attracted to Paris, largely no doubt by the reputation of Dupuytren (1777-1835), founder of the Société Anatomique of Paris in 1803, surgeon-in-chief of the Hôtel Dieu, the leading surgeon of France. At the same time operative surgery was studied under Lisfranc (1790-1847). While in Paris, Sharpey made the acquaintance of James Syme (1799-1870) who had also been a student of anatomy under Dr. John Bar-

* Read before the University of Oregon Medical History Club, Portland, March 12, 1926.

clay at Edinburgh. Syme's accomplishments as a teacher of anatomy and later as a surgeon both in Paris and at Edinburgh may have stimulated Sharpey. His surgical operations in the infirmary at Edinburgh were remarkable. Sharpey and Syme became lasting friends and made extensive collections of museum specimens wherever they travelled.

After a year in Paris under Dupuytren and Lisfranc, Sharpey returned to Edinburgh and was graduated in August, 1823, presenting for his thesis, "*De Ventriculi Carcinomate*." He now began practice in Arbroath with his step-father. However, he was not long in finding that his interest lay elsewhere. Scientific study had its hold on him and there was no way of escaping it. In 1826 he gave up practice and never returned to it. For the rest of his life he devoted himself to the study of pure science.

Returning to the Continent (1826) with his staff in hand and knapsack on his back, he trudged through France. Doubtless another visit was paid to the Hôtel Dieu. There may, however, have been another meeting that meant far more to him since his decision to follow investigation and teaching. In Paris at this time the Father of Experimental Physiology was editing the first journal of experimental physiology, and carefully checking the results of all papers sent for publication. In fact, Magendie asked authors to send their papers a month before they would be expected to appear, in order that he might repeat the main experiments therein given. He was a practicing physician who found time to build his monument in science by his contributions to physiology. His textbook, "*The Anatomy and Physiology of the Nervous System*" had appeared a year previous and perchance had fallen into Sharpey's hands. Surely the young anatomist could have gotten a thrill in watching a dog vomit after its stomach had been replaced by a pig's bladder!

Lingering a few months Sharpey plodded

on to Geneva. Nearly three months were spent here in the library and making trips over the country on foot. We next see him in Pavia, Italy. Here he may have met Scarpa, now eighty, the great surgeon-anatomist whose work had been recognized internationally. Volta was eighty-two and passed away this year (1827). Panizza (1785-1867), a surgeon-anatomist then at the height of his career at Pavia, attracted the young anatomist and he spent several weeks in study and observation here. He journeyed on to Florence and to Rome. While visiting this ancient city he probably reread parts of Galen and mused over what particular parts of anatomy that immortal discoursed upon in the streets over 1600 years previously. Sharpey's visit was brief, however, for he was roaming, and so he sauntered on to Naples. In the spring of 1828 he returned to northern Italy. Stopping at Bologna a few days, he strode on to Padua, where much of historical interest awaited him. Many of his countrymen had attended anatomy lectures here during the past two centuries. No doubt he paid a visit to the tomb of Harvey's old professor, Fabricius (1537-1619).

From Padua he went to Vienna where he spent the summer. Skoda (1805-1881) and Rokitsansky (1804-1878), the Bohemians, who were to make the new Vienna school, were completing the work for their degrees. Proceeding on to Heidelberg he met Tiedemann, the distinguished German anatomist and physiologist. On his way to Berlin, he must have met another Bohemian, John Purkinje (1787-1869), who was professor of physiology at Breslau and struggling hard to establish physiology as a separate science. Once in Berlin he remained for nine months, carefully dissecting the human body under Rudolphi (1771-1834), an able Swedish naturalist and physician.

On his return from the Continent in the autumn of 1829, he established himself in Edinburgh and engaged in microscopical observation and anatomical research. Desir-

ing to teach, he obtained the Fellowship of the College of Surgeons in 1830, a necessary qualification, and presented a probationary essay, "On the Pathology and Treatment of False Joints," a subject which was probably suggested by his intimacy with Mr. Syme, to whom the printed essay is inscribed. In 1830 he published his first work on scientific investigation: "On a Peculiar Motion Excited in Fluids by the Surfaces of Certain Animals."

In the summer of 1831 he again spent three months in Berlin. On this occasion he was chiefly employed in collecting anatomical preparations and other materials for the illustration of a course of instruction in anatomy which he expected to deliver the following winter.

During 1831-1832 a course of systematic lectures was given in the extra-academical school of Edinburgh in association with Dr. Allen Thomson, who taught physiology. Through the years Sharpey's class increased from twenty to eighty-eight in number, giving evidence of his success as a lecturer. His reputation as a teacher and man of science had advanced so that he had now come to be generally known, both in Edinburgh and at a distance, as a learned investigator and teacher.

Dr. Sharpey's connection with the Royal Society began by his election as Fellow on the ninth of May, 1839. He became a member of the Council in 1844-1845 and was appointed one of the secretaries in place of Mr. Bell in 1853. This office he held for nineteen years, when the failing condition of his eyesight obliged him to resign. He was again in 1872 chosen member of the Council for the next two years. At this time the Baly medal of the Royal Society was conferred upon him for physiological research. It is interesting here to note that the Baly medalist of the Royal College of Physicians in London in 1881 was Burdon-Sanderson, who followed Sharpey in University College as professor of physiology.

Dr. Sharpey was also a member of the Science Commission, which met under the

presidency of the Duke of Devonshire from 1870-1875. Taking an active part in its proceedings, he aided greatly by his sagacity and knowledge, the deliberations of the body. He was also one of the trustees of the Hunterian Museum of the Royal College of Surgeons and a member of many scientific societies of this and other countries. He received the honorary degree of LL.D. from the University of Edinburgh in 1859. He was also offered the chair of physiology there but was persuaded by the officials at University College to remain.

Dr. Sharpey was appointed one of the examiners in anatomy at the University of London, when that body obtained its charter to grant degrees in 1840, and he continued to perform the duties of that office during the long period of twenty-three years. He was, at a later period, a member of the senate of that university. He was also, for fifteen years, a member of the General Council of Medical Education and Registration.

At the same time that he was devotedly carrying on his researches, there appeared in the *Edinburgh New Physiological Journal* for 1835, a translation of the preliminary memoirs in which the discovery of Purkinje and Valentin on ciliary motion was announced together with an account of additional observations on the subject made by himself. Shortly afterward he embodied the whole of the information on "Cilia" in a paper published in the "Cyclopaedia of Anatomy and Physiology." Even though Purkinje and Valentin (1834) found the existence of cilia in vertebrate animals, yet Sharpey had worked on the subject previously but because of the lack of a sufficiently powerful microscope, he was unsuccessful in detecting the presence of cilia in the Batrachia.

In the summer of 1836, when Dr. Jones Quain resigned his position in the chair of anatomy and physiology in the then University of London, a desire was felt by the leading professors and authorities of that institution to give greater prominence to physiological study than had previously

been done in the London schools of medicine. After due inquiry, Dr. Sharpey was selected as the fittest person to fill the chair and carry out the object in view. He was accordingly appointed to the chair designated as that of anatomy and physiology while Mr. Richard Quain was named professor of anatomy. It now became his duty to treat fully of physiology and the functions of organs, together with the study of minute and visceral anatomy, while Professor Quain taught the descriptive and practical aspect of anatomy. There was then established in London for the first time the full and systematic teaching of physiology, which had previously been only imperfectly treated as an appendage to the course of anatomy in the London medical schools. The difference in the characters of the fellow professors, Sharpey and Richard Quain, was well known to the students. Quain and Sharpey greatly improved the *Anatomy of Jones Quain* under combined editorship. Sharpey was the senior editor for the fifth, sixth and seventh editions. The ninth edition was dedicated to him.

His lectures, excepting an introductory one, were delivered from notes only. He made use of diagrams and pictorial illustrations as well as of anatomical preparations and physiological experiments. He was one of the first to introduce the employment of the microscope for the practical illustration of his lectures. For this purpose he employed a revolving table which still exists in the physiological laboratory of University College. As experimental equipment became more abundant in later years, Sharpey continued to make physiology as practical as possible. For thirty-eight years he held the position as professor of physiology in University College, resigning in 1874 because of his age and ill health.

Sharpey's laboratory, therefore, became an active one under his direction and it is significant as being one of the first physiological laboratories established. Although there was instruction in physiology in many institutions it was only theoretical

discussion. It was thirty-four years later (1870) that Bowditch established the first physiology laboratory in this country in Boston. At Breslau, since 1824 Purkinje had accompanied his lectures with demonstrations but he did not have a laboratory in which to work until 1839.

Billroth says as regards German schools:

The sequence of the establishment of entirely independent, separate professorships of physiology is to the best of my knowledge, as follows: Halle 1843, Tübingen 1853, Kiel 1857, Berlin and Heidelberg 1858, Bonn 1859, Zürich 1862, Berne and Munich 1863, Leipzig and Würzburg 1865, Greifswald 1868, Basel and Erlangen 1872. Many of the new Professorships were for a time adjunct.

Up to the age of sixty-eight or seventy, Sharpey retained most of the vigor of his earlier years, but about the year 1871, the rapid formation of cataracts together with some dullness of hearing began to interfere seriously with his efficiency. These affections led to his retirement from the Royal Society in 1872 and from the professorship in University College two years later. Following his retirement he was appointed professor emeritus.

Even after his health was failing, Sharpey continued to haunt his old laboratory. His health improved and in 1878 he made a tour of the Continent with his former pupil and assistant, Michael Foster. While on this trip he contracted a bronchitis that proved stubborn. After it was finally overcome he had aged considerably and a recurrence of an attack in March, 1880, proved fatal. He died sitting in his chair about 11:00 o'clock at night April 11. His body was returned to Arbroath for burial.

He had a host of friends among former students and men of science. Long before he retired (1869), his friends and former pupils showed their regard for his services at the college and to science by raising a sum of money for endowing a Sharpey Memorial Scholarship in connection with University College. An oil portrait and a marble bust were presented at the same

time. Sharpey presented his library to the College in 1872 and at his death bequeathed £800 from his small holdings to increase the endowment of the Sharpey scholarship in physiology. Upon his retirement (1874) Gladstone's government accorded him an annual premium of £150 because of his eminent services as a teacher and man of science.

Although not numerous, Sharpey's contributions deal with a variety of subjects. In 1823 he wrote "De Ventriculi Carcinomate"; in 1830, "A Probationary Essay, on the Pathology and Treatment of False Joints."

Others of his writings were: "On a Peculiar Motion Excited in Fluids by the Surfaces of Certain Animals"; "Remarks on a Supposed Spontaneous Motion of the Blood"; "An Account of Professor Ehrenberg's Researches on the Infusoria"; "An Account of the Discovery by Purkinje and Valentin of Ciliary Motions in Reptiles and Warm Blooded Animals, with Remarks and Additional Experiments"; "Echinodermata." He edited the fifth, sixth and seventh editions of Jones Quain's "Elements of Anatomy," and he contributed important information to Baly's translation of Muller's Physiology (1837-1840). He wrote an article published in *Brain*, entitled "Case of Loss of Memory in an Individual Which had Come under his Notice in 1824, in Which the Lady had to be Completely Retaught." The minute anatomy in Jones Quain's Anatomy was largely written by Sharpey, and the "perforating fibers of Sharpey" serve to immortalize his excellent observation of histological structure.

The name of William Sharpey stands out as the father of efficient teaching in physiology in England. His laboratory methods

of teaching with the microscope and revolving table are classical. He was a pioneer in the field and made a great success of it. He lived to see his plan in operation in all the better schools. That his teaching was not lost with the day's work is seen by the many contributors from among his pupils. Lord Lister could not give Sharpey enough credit for his own success. His stimulus and attachment to science was gained from Sharpey's lectures and demonstrations. Sir Michael Foster, too, was a product of his work. Even though he had done nothing more, to have credit for launching these two scientific leaders lifts him far above the average. To Sharpey, teaching was a great delight and he did enough original investigation to measure up to Tyndall's standard when he said:

The original investigator constitutes the fountain head of knowledge, but it belongs to the teacher to give this knowledge the requisite form, an honorable and often difficult task. It is a task that receives its final sanctification when the teacher himself honestly tries to add a rill to the great stream of scientific discovery.

BIBLIOGRAPHY

- GARRISON, F. H. History of Medicine. Ed. 3, Phila., 1921.
 STIRLING, W. Some Apostles of Physiology. Lond., 1902.
Nature, Lond., April 17, 1880, *xxi*, 567.
Lancet, Lond., April 24, 1880, *i*, 662.
Brit. M. J., Lond., April 17, 1880, *i*, 606.
Med. Times & Gaz., Lond., April 24, 1880, *LXXVII*.
Proc. Roy. Soc., Lond., 1880-1881, *xxx*, *x*.
Edinb. M. & S. J., 1830, vol. *ii*.
 LIBBY, W. History of Medicine in Its Salient Features. Bost., 1922.
 Dictionary of National Biography. Lond., 1899.
 PATERSON, R. Life of James Syme. Edinb., 1874.

LAËNNEC AND CULPEPER AS DEPICTED BY KIPLING

By LOUIS J. BRAGMAN, M.D.

SYRACUSE, NEW YORK

"I'VE just finished my new book of children's tales," wrote Rudyard Kipling to William Osler,¹ "and shall be curious to see whether the profession will spot Dr. Nicholas Culpeper and René Hyacinthe Laënnec as I have drawn them."

In the library of Osler there was to be found a copy of that juvenile book, "Rewards and Fairies," enhanced by an inscription by the author consisting of a quotation and a note. "Excellent herbs had our fathers of old," reads the quotation; it is the first line of the poem accompanying the story of Nicholas Culpeper, reciting rather truthfully both the courage and the short-comings of our ancient fathers. The note appended to the book is as follows:

"Dear Osler,—Herewith my book of tales. I wouldn't bother you with it except for Nick Culpeper and Laënnec for whom I feel you are in a way responsible."

"Marlake Witches," in which René Théophile Hyacinthe Laënnec is the leading figure, and "A Doctor of Medicine," in which Nicholas Culpeper plays a stirring and dramatic rôle, are of historical and medical value for the glimpses which they give into the lives of these two distinctively famous physicians.

Laënnec, born in France in 1781, had not as yet announced his discovery that was later to mark an era in the development of medicine. For it was not until 1819 that he published his classical book, "De l'Auscultation Médiante," prior to which, as Osler has said²: "the examination of a patient had been largely by sense of sight, supplemented by that of touch, as in estimating the degree of fever, or the character of the pulse." But with the introduction of the stethoscope a new day began, heralding the onset of the extensive development of physical diagnosis.

During the war between England and France, Laënnec was captured by the

enemy. Inasmuch as he was a mere physician in military service, of neither renown nor importance, he was not deemed worthy the bother of exchange, and was consequently billeted in an English household.

The blossoming daughter of the family that was quartering him had fallen a victim of pulmonary tuberculosis. "Her cheeks were pale except for two pretty pink patches in the middle, and she talked with little gasps at the end of her sentences, as though she had been running."

Jerry, a queer neighborhood character, who was known as "the witch.wizard" for his ability of treating people with herbs and charms, had been advising the girl, whimsically, and with understanding, thus:

You know the names of the Twelve Apostles, dearie? You say their names, one by one, before your open window, rain or storm, wet or shine, five times a day, fasting. But, mind you, twixt every name you draw in your breath through your nose, right down to your pretty little toes, as long and as deep as you can, and let it out slowly through your pretty little mouth. There's virtue for your cough in those names spoke that way. And I'll give you something you can see, moreover. Here's a stick of maple which is the warmest tree in the wood. It's cut one inch long for every year. That's sixteen inches. You set it in your window so that it holds up the sash, and there you keep it, rain or shine, wet or fine, day and night. I've said words over it which will have virtue on your complaints.

René, who was destined to become a great physician, and whose subsequent description of tuberculosis came to be considered "the finest chapter in clinical medicine,"² had formed a close companionship with the quaint, though wise and practical healer. One day the girl, spying on the two "doctors," discovered them "playing with wooden toy trumpets. They were not real trumpets, because Jerry opened his shirt

collar, and René put one end of his trumpet against Jerry's chest, and put his ear to the other. Then Jerry put his trumpet against René's chest, and listened while René breathed and coughed."

Laënnec had quickly sensed the fact that the "witch wizard" possessed a native knowledge of medicine, and had therefore taken him into his confidence concerning his new discovery of direct auscultation.

"This hollywood one is the best," ventured Jerry, critically. "'Tis wonderful like hearing a man's soul whispering in his innards; but unless I've a buzzin' in my ears, you make much about the same kind o' noises as old Gaffer Macklin—but not quite so loud as young Copper. It sounds like the breakers in a reef—a long way off. Comprenny?" "Perfectly," answered René, with a hint of tragic prophecy, "I drive on the breakers. But before I strike, I shall save hundreds, thousands, millions, perhaps, by my little trumpets."

And so it was destined to be. But in the meantime he was anxious to listen to as many chests as he could before announcing his device to the world. Jerry, as an envoy, had been endeavoring to break ground for him amongst the villagers, but with scant success. "They've had it at me for some time back because o' my tryin' your trumpets on their sick."

So his benevolent efforts for the time being were meeting with the usual rebuffs of ignorance and superstition. He was rewarded for his humanitarian aspirations with accusations of "impudently prying into God's secrets by means of some papistical contrivance"; his stethoscope was called the devil's ear-piece; and as to its use, it left "round red witch-marks on people's skins, and dried up their lights, and it made 'em spit blood, and threw 'em into sweats."

The story ends with the recognition of the gravity of the girl's illness by means of the hollywood trumpet. Told in a somewhat sentimental style, "Marlake Witches" gives a touching picture of the early struggles for recognition of one of the greatest contributors to the science of medicine,

who himself succumbed to the disease for which his trumpet has proved invaluable.

Nicholas Culpeper (1616-1654) devoted his life to the study and practice of astrology and medicine. He has left behind a written record in the form of an extensive work on herbals, called "The English Physician," and also an "Astronomical Judgement of Diseases." The latter, however, has been considered to be pure quackery, and of negative medical value.

According to Sidney Peel,³ he was a charlatan who mixed astrology with medicine in sufficient proportion to suit the popular taste. This frank critic declares further: "If Nicholas Culpeper had lived in the nineteenth century he probably would have been a fashionable physician, with a tendency to dabble in hypnotism and other mysterious byways of science, looked upon askance by the majority of his profession, and treated contemptuously by the medical papers."

"A Doctor of Medicine" obviously arose in the mind of Kipling through the interesting astrological therapeutics of Culpeper, "than whom there have been worse men to take lessons from." The sun, the moon and the five planets: Jupiter, Mars, Mercury, Saturn and Venus, ran the theory, governed all worldly activities. If one recognized in an accurate fashion their sympathies and antipathies, they could be made, among other things, to cure the sick and hurt the enemy.

"I myself," Culpeper elaborated, "have saved men's lives, and not a few either, by observing at the proper time . . . so small a beast as a rat in conjunction with so great a matter as this dread arch above us."

This remark was made in reference to a devastating plague:

It was worst on the north side of the street, for lack, as I showed 'em, of sunshine; which, proceeding from the *primum mobile*, or source of life (I speak astrologically), is cleansing and purifying in the highest degree. The plague was hot, too, by the corn chandler, where they sell forage to the carters; extreme hot in both Mills along the river, and scattering in other

places, *except*, mark you, at the smithy. Mark here, that all forges and smith-shops belong to Mars, even as corn and meat and wine-shops acknowledge Venus for their Mistress.

But the actual cause of the plague mystified him, he added, so throwing caution to the wind, and "choosing a good hour by his almanac, he clapped his vinegar cloth to his face, and entered some empty houses, resigned to wait upon the stars for guidance." In due time his patience was rewarded, for he finally detected a "whitish rat, very puffed and scabby, which sat beneath the dormer of an attick through which shined our Lady the Moon. Whilst I looked on him—and her—she was moving towards old cold Saturn, her ancient ally—the rat creeped languishly into her light, and there, before my eyes, died."

Mars, simultaneously very red and heated, was "bustling about his setting." This combination of events solved the annoying riddle, for the cleansing influence of Mars, warring against the Moon, "had stretched out to kill the rat under the nose of his natural mistress, the Moon."

Why had the plague avoided the smithies? Plainly because of the protective influence of Mars. The natural conclusion which he pronounced was as follows: "Destroy and burn out the creatures of the Moon, for they are at the root of your trouble." Thus by this circumspect astrological reasoning did Culpeper discern the true plague-inciting enemy, "revealed at last by the stars." As he further explained:

Truly there is a time for everything; and the physician must work with it or miss his cure. I persuaded 'em, sick or sound, to have at the whole generation of rats throughout the village. And there's a reason for all things too, though the wise physician need not blab 'em all. *Imprimis*, or firstly, the mere sport of it, which lasted ten days, drew 'em most markedly out of their melancholy. I'd defy sorrowful Job himself to lament or scratch while he's routing rats from a rick. *Secundo*, or secondly, the vehement act and operation of this chase or war opened their skins to generous transpiration—more vulgarly, sweated 'em handsomely; and thus further drew off their black bile—the

mother of sickness. Thirdly, when we came to burn the bodies of the rats, I sprinkled sulphur on the faggots, whereby the onlookers were as handsomely suffumigated. This I could not have compassed if I had made it a mere physician's business; they'd have thought it some conjuration. Yet more, we cleansed, limed, and burned out a hundred foul poke-holes, sinks, slews, and corners of unvisited filth in and about the houses in the villages, and by good fortune, burned the corn-chandler's shop. It is noteworthy that the venom of the plague translated or turned itself into, and evaporated, or went away as, a very heavy hoarseness and thickness of the head, throat, and chest. (Observe from my books which planets govern these portions of a man's body). None the less, the plague, *qua* plague, ceased and took off from the morning of the day that Mars enlightened me by the Lower Mill.

He had thus conclusively proved the contention "that by Divine Astrology and humble search into the veritable cause of things—at the proper time—the sons of wisdom may combat even the plague."

Although Nicholas Culpeper was an outstanding type of "our fathers of old," who preferred to "look at the stars when a patient is ill," yet he showed undisputably that he also possessed a fair measure of their excellent heart and their excellent courage. For this he surely deserves "to be remembered among those who with tireless industry and unconquerable resolution have laboured unceasingly upon many fields to promote the happiness of their fellow-men, ungrudging of their own."³

"The most confident of physicians," Kipling characterizes Culpeper in another of his works.⁴ And in the boniface portraits sketched in the two tales he has given an exceedingly sympathetic interpretation of these diametrically opposed figures in the history of medicine.

REFERENCES

1. CUSHING, H. Life of Sir William Osler. N. Y., 1925, vol. II.
2. OSLER, SIR W. Evolution of Modern Medicine. New Haven, 1921, p. 203.
3. PEEL, S. The Nineteenth Century. 1898, XLIII, 755.
4. KIPLING, R. Wireless.

GALEN'S STUDIES AT THE ALEXANDRIAN SCHOOL*

By JOSEPH WALSH, M.D.

PHILADELPHIA, PA.

GALEN was born in the beautiful, highly cultured, conservative old city of Pergamum, Asia Minor, one thousand miles from the prejudicial influences of the capital. Under the guidance of a broadly educated, devoted father, who was an architect, he was given an excellent training in the classics, mathematics and philosophy.

At the age of seventeen¹ he began the study of medicine, and after spending four years at the celebrated temple of Aesculapius in his native city, under a number of excellent teachers, but especially Satyrus (II, 224; XVI, 484),² who imbued him with a love for anatomy (xv, 136), he went to Smyrna, another of the great medical centers. Here he spent two more years, particularly under the great Pelops (v, 112; VIII, 194), and became further enthused.

He journeyed from Smyrna to Corinth to place himself under Numesianus, the anatomist, surgeon and commentator on Hippocrates (xvi, 197), to whom as his teacher Pelops gave credit for his zeal. Arriving in the new capital of Greece he found Numesianus called to the School of Alexandria, and he followed him (II, 217). He began his studies in Egypt, therefore, in 153 A.D., at the age of twenty-three.

Alexandria was the second city of the Roman Empire with a population of over five hundred thousand, and the first commercial city of the world, having the greatest seaport and the largest and most active industries. It possessed the greatest scien-

tific school of ancient times, and its brilliant teachers and wonderful discoveries have never been surpassed. We owe to it geometry, trigonometry, physics and astronomy, grammar and criticism, and considerable of medicine.

The school was quartered in the Museum, or the temple of the Muses, which contained not only the classrooms, but the largest library and finest collections of antiquity. Galen alleges (II, 221) it was worth a special visit on account of these collections, even if the lectures were not attended. The object in the museum over which he particularly enthused was a complete human skeleton (II, 220), apparently on exhibition nowhere else in the empire. Other places he found of interest were the Pharos with its miracle-working compound pulley, for the invention of which he gives credit to Archimedes (xviii, 747), and the temple of Serapis with its astronomical observatory, where Ptolemy was at the time pursuing the work on which he remained the authority for the next thirteen centuries.

Founded four hundred years before Galen, and shortly after the death of Aristotle with his wonderful library and collections as a nucleus and incentive, the school devoted itself to the investigation of natural facts, and put on a scientific basis most of the physical sciences.³ Its teachers were so eminent that the mere enumeration of their names is sufficient to recall them, and since our student quotes them so frequently, it appears worth while mentioning the most celebrated.

* Read before the Section on Medical History of the College of Physicians, Philadelphia, Pa., January 27, 1927.

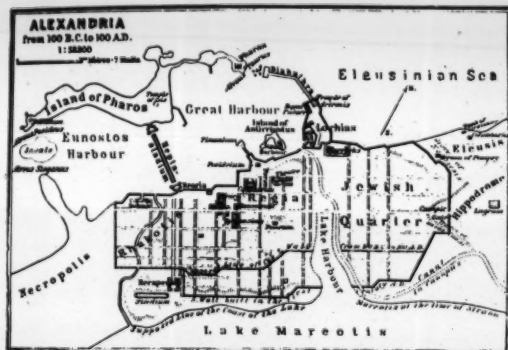
¹ He was born at the end of September 130 (xiii, 599), and entered medicine apparently early in that month 148, just before he reached the age of eighteen.

² The references in parentheses indicate the volume and page of the Kühn edition, Claudii Galeni Opera Omnia, Leipzig, 1821.

³ The data relative to the Alexandrian School and its scholars are taken from Galen, and a number of other sources, but principally Klippel, *Ueber des Alexandrinische Museum*, 3 vols., Göttingen, 1838; Kingsley, *Alexandria and Her Schools*, Cambridge, 1854; and Figuier, *Vies des Savants Illustres*, Paris, 1870.

Euclid (*fl.* 300 B.C.), the father of geometry, Galen puts on a plane with Hippocrates, Plato, Chrysippus, and Aristotle, and spent his whole life in endeavoring to create a medicine as logical, thus anticipating Descartes by 1400 years. He refers frequently to

the cylinder, the square of the parabola, and the relation of the circle to its diameter. Spreading himself further he became the father of physics, and the number of his discoveries greatly exceeds, and of his inventions almost equals that of our own Edison.



MAP OF ALEXANDRIA (FROM BAEDEKER'S EGYPT, 1902).

geometry, and in his elucidation of vision and crises employs several problems while saying to his auditors (III, 830): "It is necessary to learn your Euclid, and only then can you understand my explanations in medicine."



EUCLID (FROM THE HISTORIC GALLERY OF PORTRAITS AND PAINTINGS, VOL. I, LONDON, 1807).

The geometer was followed by the progenitors of trigonometry, Archimedes, Aristarchus of Samos, Eratosthenes, Apollonius of Perga, Hipparchus and Ptolemy.

In mathematics Archimedes (*fl.* 230 B.C.) gave us the measurements of the sphere and



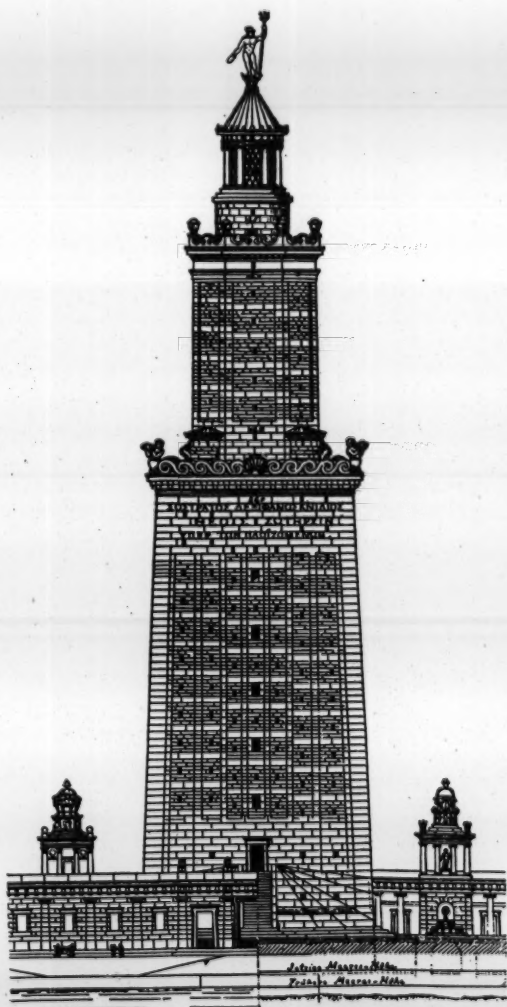
APOLLONIUS OF PERGA (*fl.* 210 B.C.) IN THE MUSEUM OF ALEXANDRIA. HE WAS A MATHEMATICIAN, POET, MUSICIAN, ORATOR, PHILOSOPHER, PHYSICIAN AND ASTRONOMER, AND TAUGHT FOR A WHILE ALSO AT PERGAMUM, GALEN'S NATIVE CITY. HIS GREAT WORK ON CONIC SECTIONS WAS COMMENTED ON SIX HUNDRED YEARS LATER BY HYPATIA, AND REMAINS AN AUTHORITY TODAY, A RECENT PUBLICATION BEING EDITED BY HALLEY OF COMET FAME. GALEN ALSO ACQUIRED MORE THAN A PASSING KNOWLEDGE OF THESE SUBJECTS, EVEN ASTRONOMY AND MUSIC, AND WAS PROUD OF HIS PROFICIENCY ON THE LYRE AND CITHARA (X, 3).

These inventions or improvements embrace practically everything connected with hydrostatics and mechanics, as pumps, levers, pulleys and engines of warfare. The best known are those used with such effect against the Romans in the siege of his native city Syracuse, and it was on account of Archimedes that the Romans were obliged to take it by siege rather than by storm. Plutarch relates if even a piece of rope were seen dangling over the wall, the Roman soldiers would cry out that Archimedes was at it again, and fly in dismay. From Galen comes the story (I, 657) of his setting fire to the enemy ships by a hand-glass.

It was during his sojourn the Pharos was built, and possibly for it was invented the compound pulley for the lifting of the huge bales of wood fuel required for its broadly visible beacon.

The science of physics was further developed under Ctesibius and Heron (*fl.* 125 B.C.), who are responsible for the invention of a pipe organ run by a water pump, a

force pump used in fire-fighting, windmills, penny-in-the-slot machines, a fountain in which water rose higher than its level, a toy



THE PHAROS. (RECONSTRUCTED FROM THE STUDIES OF HERMANN THIERSCH: PHAROS ANTIKE ISLAM UND OCCIDENT. LEIPZIG, 1909.)

TO UNDERSTAND THEIR FEELINGS TOWARD THIS WONDER, WE MUST REMEMBER IT WAS THE HIGHEST (500 FEET) AND MOST BEAUTIFUL TOWER IN THE WORLD, PUT A BEACON ON TOP SAVING THE LIVES OF THOUSANDS OF SAILORS, FILL IT WITH INTRICATE MACHINERY, MIRACULOUS IN ITS CAPABILITY, CROWN IT WITH A MYSTERIOUS GLASS BY WHICH SHIPS CAN BE SEEN AT A DISTANCE BEFORE THEY BECOME VISIBLE TO THE NAKED EYE, LET FOUR HUNDRED YEARS ELAPSE DURING WHICH IT HAS GRADUALLY BECOME A LEGEND, OR EVEN A GOD—THIS IS HOW THE PHAROS APPEARED TO THE ALEXANDRIAN CONTEMPORARIES OF GALEN.

steam engine run on the turbine principle, and a water-clock which was the timepiece or the next fourteen centuries. Galen never

got over his admiration of the water-clock (v, 80, 84; xi, 256), "that triumph of mathematics" he practically calls it, and it became his ambition to make his prognoses in medicine as accurate. As a matter of fact, later at Rome, nothing annoyed certain envious colleagues so much as his ability to predict the exact hour of the malarial fever paroxysms. The water-clock of which he speaks indicated not only the hours, but the days of the week, of the month, and even the eclipses of the year.

Similarly to mathematics and physics, practically all of our foundations in astronomy come from Alexandrians. In this galaxy of great names frequently mentioned by the Pergamite belongs Aratus (*fl.* 270 B.C.), the only profane scientist quoted in the New Testament, and as far as I know in the entire Bible. It is considerably from his popular work, translated into Latin verse by Cicero, that Julius Caesar derived the knowledge resulting in the change of the calendar.

Aristarchus of Samos (*fl.* 264 B.C.), applying Euclid's principles, measured the diameter of the sun, the distance from the earth of the sun, and moon, and was the first promulgator of the heliocentric theory.

Eratosthenes (*fl.* 225 B.C.) was the first mathematician and astronomer to measure the earth and the moon, and was in addition a geographer, grammarian, poet, antiquarian and philosopher. He was one of the most brilliantly educated men of all time, and on account of his mastery of so many subjects was called "the intellectual Pentathlete." In his measurement of the circumference of the earth he made it 25,000 miles.

Hipparchus (*fl.* 130 B.C.) was recognized as the founder of scientific astronomy, catalogued the stars, invented the armillary sphere for determining their position, discovered the precession of the equinoxes, made the first scientific determination of the length of the year, gave us latitude and longitude, and was one of the fathers of trigonometry. Galen describes him (ix, 907; xvii, 23) in association with Archimedes as one of the world's greatest men. Unfortunately

he went back to the geocentric theory, which on his authority prevailed till Copernicus.

In philosophy the school developed the two most eminent Stoics, Chrysippus (*fl.* 220 B.C.) and Posidonius (*fl.* 90 B.C.), the former placed by Galen in the rank with Plato and Aristotle; the latter, the friend and teacher of Marius, Pompey and Cicero, and called by Strabo the most learned man of his time, and by our physician (iv, 819; v, 652) the most learned of the Stoics. Chrysippus considered every subject under the sun, discussed every opinion ever expressed, no matter how extravagant, and following in his footsteps Galen left no subject in medicine, that he did not attempt to solve.

Posidonius was in addition an authority on mathematics, and in spite of the fact that his predecessor, Eratosthenes, gave the correct measurement of the circumference of the earth, it was Posidonius' promulgation of 18,000 miles which prevailed for the next sixteen centuries, and allowed Columbus to think he had reached India.

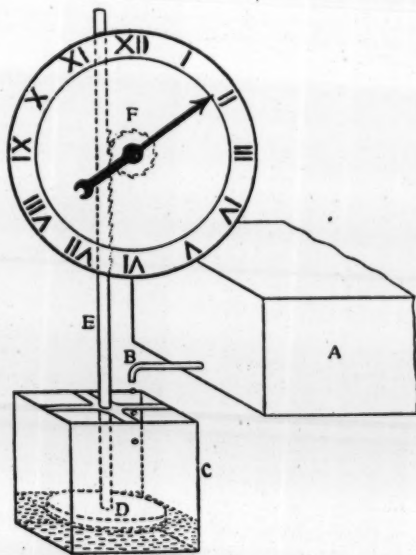
In the same way, practically all of our foundations in grammar, philology and criticism were developed by the Alexandrian School, and among its teachers we find Zenodotus and Callimachus, two of the world's intellectual geniuses, and the earliest superintendents of the library; Aristophanes of Byzantium (*fl.* 200 B.C.), to whom we owe punctuation and the Greek accents; and Aristarchus of Samothrace (*fl.* 184 B.C.), the most celebrated literary critic of antiquity whose textbook of Homer, and the division of the poem into books is that which we substantially use.

That these studies were continuing is evidenced by the fact that during Galen's sojourn were teaching Apollonius Dyscolus, called by Priscian, the greatest of grammarians, and Ptolemy, that giant in intellect, who remained the authority on geography, astronomy and higher mathematics for the next thirteen hundred years.

In medicine the number of eminent names corresponds with those of the other sciences,

and again their mere enumeration recalls them:

Herophilus (*fl.* 300 B.C.), anatomist, had the advantage of dissecting human cadavers, and he was the first one to do necropsies for the purpose of learning the nature and the seat of disease (Larousse). He described the choroid plexus and other parts of the brain, differentiated between the portal and chyle vessels, named the prostate, the retina and arachnoid, and, according to

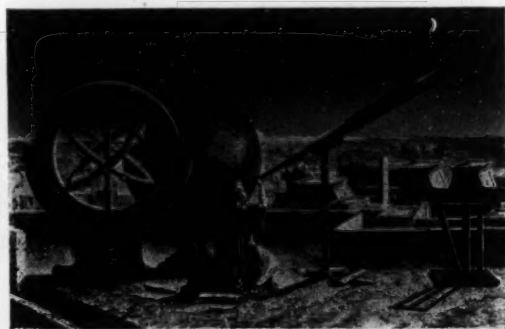


WATER-CLOCK DESCRIBED BY VITRUVIUS. (FROM THE LEGACY OF ROME, CLARENDON PRESS, 1923.) FROM THE TANK (A) WATER DRIPS AT A UNIFORM RATE THROUGH THE SMALL PIPE (B) INTO THE RESERVOIR (C) IN WHICH IS THE FLOAT (D). FROM THE UPPER SURFACE OF D RISES THE SHAFT (E), THE TEETH OF WHICH BY THEIR MOVEMENT AS THE SHAFT RISES, ROTATE THE COG-WHEEL (F). TO THIS COG-WHEEL IS ATTACHED A HAND THE POSITION OF WHICH, ON THE SURFACE OF THE DIAL, INDICATES THE HOUR. THIS SHOWS THE PRINCIPLE ON WHICH IT WORKED. THE ACTUAL CLOCKS WERE MUCH MORE COMPACT AND ENCASED IN ARTISTIC CABINETS. (FOR ILLUSTRATION SEE CENTURY DICTIONARY AND CYCLOPEDIA UNDER CLEPSYDRA.)

Galen, the duodenum (ii, 780), torcular (ii, 712; iii, 708), calamus scriptorius (ii, 731) and varicose veins (iv, 582). He was the first to recognize that the arteries contained blood. From him we take the four phases of the heart, the systole, diastole and the two pauses, as well as ideas relative to size, strength, rate and rhythm of the pulse (viii, 592).

Erasistratus (*fl.* 290 B.C.), who quitted the practice of medicine in order to study anat-

omy, contributed more to it than any physician of antiquity. He described the convolutions of the brain, drew the generalization of the relation of their complexity and mental development, which Galen denied, differentiated sensory and motor nerves, described the valves in the heart and in the veins, described the liver and bile, suggested the thought of anastomosis between the arteries and veins, and was the first to speak of the parenchyma of organs



HIPPARCHUS IN THE OBSERVATORY OF ALEXANDRIA WITH THE ARMILLARY SPHERE, WHICH HE INVENTED FOR DETERMINING THE POSITION OF THE STARS. (FROM FIGUIER: VIES DES SAVANTS ILLUSTRES. PARIS, 1870.)

(1, 599). In surgery he was considered a good operator, and invented the sound. As a practitioner he rejected purgatives, condemned gunshot prescriptions and the abuse of venesection, and recommended hygiene, diet, careful living, baths, exercise and massage. He opposed humoral, and insisted, at least to a certain extent, on solid pathology. Next to Hippocrates, Galen mentions Erasistratus most frequently, in fact he puts them almost on the same plane (x, 20), and allows that these two with Herophilus were the three greatest physicians of past times.

Dioscorides (*fl.* 55 A.D.), is generally recognized as the greatest pharmacologist of antiquity, and still talked of by lay people in the East. Galen says of him (xi, 794): "In his five books he gives us a complete study, not only of plants but of their stems, roots, fruits and juices, as well as of all metals and parts of animals; in fact, it seems to me the most perfect treatise on materia medica ever written."

Rufus of Ephesus (*fl.* 100 A.D.), anatomist, is also well known for his *materia medica* (xi, 796) and his splendid commentaries on the aphorisms, prognostics and humors of Hippocrates, which Galen used as a textbook and commended highly (xvi, 196; xix, 57). He described the infundibulum, the capsule of the lens, the chiasm, the difference in size of the cardiac ventricles and the thickness of their walls, distinguished the pancreas from the mesenteric glands, and discovered the thymus. From him Julius Pollux, the rhetorical teacher of Prince Commodus, while Galen was his physician, took the anatomical terms for his great popular Encyclopedia (the *Onomasticon*).

Soranus of Ephesus (*fl.* 120 A.D.) was the father of gynecology, and in his hands the speculum was a common instrument. The completeness of his practical exposition of the subject is remarkable. His embryology was adopted by such theological writers as St. Augustine. He is the only one of the sect of Methodologists (xiv, 684) whom Galen treats with respect (xii, 493, 495), though he calls his pupil Attalus, whom he met in Rome, an ass (x, 915).

Theon was the promulgator of massage, and his ideas Galen commends as superior to those of even his god Hippocrates (vi, 96, 182). When he lived is unknown, but probably shortly before our student.

The three well-known Alexandrian anatomists immediately preceding Galen were Marinus (*fl.* 130 A.D.), Quintus (*fl.* 140 A.D.) and Lycus (*fl.* 150 A.D.). Galen employed the textbook of the first and lauds it highly, quoting it frequently in connection with the anatomy of the nervous and muscular systems (xviii, 926). The second left no writings, but he was idolized by three of his pupils, who were teachers of the Pergamite. Though the Roman physicians were enthusiastic about Lycus, Galen disputed almost everything he wrote, and even entitled one of his works, "What Lycus did not know about anatomy."

Though our student came to Alexandria

particularly for medicine, we learn from his writings that he pursued all the previously described studies, and his illustrations from mathematics and astronomy became so frequent, that later certain of the less highly educated physicians of Rome, not understanding, called him to his prejudice, soothsayer and magician.

In philosophy⁴ he found no Euclid or Archimedes, no Chrysippus or Posidonius, but instead a class of Sophists who were debating about words, and allowing the most preposterous hypotheses to run away with them.

Galen refused, however, to be led astray, and because of the lengths to which theories were leading others, he became disillusioned with contemplative philosophy in general, and became the author of a great practical system of his own based on inductive reasoning, which anticipated at least somewhat Descartes and Francis Bacon. He tells us his experiences:

When I asked [xix, 39] the philosophers [referring to Stoics, Peripatetics and Platonists] if what they taught was practical, and would be of service in the future, they parried my question by insisting it, at least, enabled one to differentiate the true from the false, and with this capability all wisdom would be mine. I

⁴ In philosophy we are obliged to distinguish two schools, that of the Museum, of which we hear little except through Galen, and from his account there was evidently nothing worth preserving; and that of apparently not a small number of the people at large, of which we hear considerable on account of its preservation in Church History. With the latter Galen failed to come in close contact for in spite of opportunity he never mentions it.

From history we know, however, that at this time was developing a condition of affairs, difficult to describe, since no such general insanity has recently prevailed. The city was going mad over Neo-Platonism (Gnosticism), a system of theological speculation rather than philosophy, which had no basis either in fact or in properly developed intellectual theory. Two hundred and fifty years before, Chrysippus had taken Stoicism and made a religion of it, which was now followed by Galen and most of his friends, the Neo-Platonists took elements from Platonism, Judaism, Paganism and Christianity and made a religion which was philosophically absurd and theologically ridiculous.

listened, therefore, to the different celebrated teachers and got many ideas in logic, but after considering them carefully found them useless for everyday life. In addition, on everything not absolutely apparent, they differed so among themselves, that confusion instead of clearness was produced.

"By the gods," he continues later (xix, 40), "they taught such nonsense that I fell into Pyrrhonic doubt of all things except arithmetic and geometry."



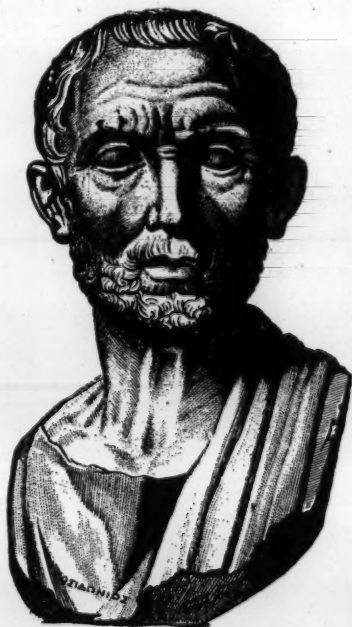
CHRYSIPPUS (FROM VISCONTI: ICONOGRAPHIE GRECQUE. PARIS, 1808).

This shows his modern pragmatism, though physicians always belonged to this school unlike most of the philosophers and many of the mathematicians, even Archimedes, who not interested in the practical application of his amazing discoveries insisted that from this standpoint they simply represented geometry at play.

In some of his medical teachers he was equally unfortunate, particularly Julian, an aggressive personality and prolific writer. Filled with enthusiasm by the panegyrics of Pelops, he hastened to Alexandria after Numesianus, and experienced such profit

from his instruction, that on one of his trips he accompanied him up the Nile to Memphis (Cairo), or even Thebes and Philae (xvii, 155). He also mentions Lucius, a surgeon, and Heraclianus, an anatomist, with respect.

He found, however, the museum dominated by the sect of Methodologists, whose system of medicine was based on principles we can only commend him for antagonizing, and on this medical teaching, on its pro-



POSIDONIUS (FROM VISCONTI: ICONOGRAPHIE GRECQUE. PARIS, 1808).

genitor Asclepiades (who was, by the way the family physician of Cicero), and particularly on its chief exponent, Julian, he exhausts the derogatory and abusive adjectives of the Greek language.

Forty years later he tells his pupils in Rome (xviii, 806):

In Alexandria the art of medicine was taught by ignoramuses in a sophistical fashion in long, illogical lectures to crowds of fourteen-year-old boys, who never got near the sick.

If I told you what the Methodologists taught, while thinking they were teaching the scientific and useful, you would doubt my sanity [x, 53]. In truth, it is impossible to describe how little

we learned from Julian, who was unable to explain the difference between pathos and nosos.⁵ . . . In addition he adopted the Methodologists' definition [x, 56] that health is the condition existing in the absence of disease, which is to me absurd, because the clause "in the absence of disease" is so evident as to make even a child laugh. And if it could be thus defined, then disease would be a condition of the body in the absence of health, each definition thereby describing not what it is, but what it is not.

The discussion continuing on slightly different lines, Julian insisted (x, 57) that Galen failed to understand, possibly because health and disease are not contraries, but show a medium between, which can be called neither. Exasperated by this logic, the Pergamite says:

Hearing this, I went away surprised and sorrowful,—sorrowful at his want of sense and surprised that with these glaring errors before them there could be sufficient stupid pupils to fill his classes. Why, I asked, is disease not contrary to health because there is a medium between? According to this reasoning, black cannot be contrary to white, because of the intermediate colors, like yellow; nor heat to cold, because of tepid and temperate.

After several such experiences, becoming distracted by their misuse of words, because every Methodologist seemed to be employing them in a different sense, Galen sat down and compiled a general dictionary in forty-eight, and a medical dictionary in five books or rolls (viii, 635; xix, 48), which with later compilations⁶ put him with the great lexicographers of antiquity. In these he endeavored to make the definitions so clear that they would be generally understood, and so precise that they could not be contraverted.

⁵ An elaborate differentiation of these terms from Galen's viewpoint has recently been made by Aschoff in connection with inflammation (*Lectures on Pathology*, N. Y., 1924, p. 64), in which he takes into consideration both health and disease, and divides the latter into nosos, representing the organic reactions, and pathos, the functional disturbances. For instance, in apoplexy, nosos is represented by the lesion in the brain; pathos, by the paralysis of the extremities.

⁶ Glossaries of secular words from the dramatists.

These have been lost or are extant only in an unsatisfactory fashion, but we find the words about which we have presented him arguing defined elsewhere in his works (vi, 18, 21) as follows: "Health is that condition in which all parts of the body do their work perfectly; disease,⁷ in which one or more individual functions are performed badly or not at all." He gives a number of examples, for instance (x, 50), the eye, which is necessary for vision, and when this

There was a mania at the time among the Sophists in regard to words, their origin, exact meaning and proper employment, but it is interesting to learn that Galen did not allow Sophistical considerations to cloud the issue. He wished the proper terms used, but if clearly defined he was satisfied with synonyms. For instance, he says: "It will make no difference if someone insists that the function of the eye is sight, and another vision; it is only necessary that he explains



DIOSCORIDES HAVING AN ILLUSTRATION MADE OF THE MANDRAKE PLANT (SO-CALLED ON ACCOUNT OF ITS HUMAN FORM) WHICH HE SO ACCURATELY DESCRIBED. GALEN USED IT IN COMBINATION WITH OPIUM AND HYOCYAMUS AS A GENERAL ANESTHETIC (xi, 766; xvii, 904) IN THE WAY OF OUR MODERN "TWILIGHT SLEEP." (VISCONTI: ICONOGRAPHIE GRECQUE. PARIS, 1808.)

is impaired, disease is acknowledged by everybody.⁸

⁷ He describes disease in a modern way as a combination of four things: the injured function, the local condition producing it, the cause of this local condition, and the symptoms that necessarily follow; in other words, disease consists of a cause acting locally producing disturbances of function with the attending symptoms (x, 78). For instance, corruption (the cause) produces abscess (the local condition), and this in turn the interference with function and the symptom pain (x, 86).

⁸ On account of our agreement with Galen, it is amusing to find several of our unabridged medical dictionaries defining these words in Julian's terms, and one of them even more ridiculously defining

what he means." Again, "He may call the eye a part, or a particle of the body, but that will be no obstacle to intelligent discussion or investigation" (x, 43). The Pergamite desired to avoid error, but insisted that differences in terminology did not necessarily imply differences in fundamental concept.

Again he relates that Julian had no hesitation in introducing into therapeutics the "disease" as a pathological condition of the body. It is a pleasure, however, to note that the philosopher-scientist, Thomas Henry Huxley, repeats Galen in defining it as a perturbation of the normal activities of a living body.

silliest notions, for instance, though Galen was willing to allow a place to music, Julian was giving lectures on the therapeutic use of art, particularly painting (x, 54). With this and analogous things in mind he writes (xi, 256)⁹:

The trouble with sectarians is they found their belief on unproven theories, and then build on them. This is because they never stud-

the previously acquired knowledge, until it eventually arrives, incredible as it may seem to the uneducated, not only at the magnitude of the sun, moon and earth, but at their distances. And through it have been invented and constructed sun-dials and water-clocks, which successfully predict the wanderings of the sun and moon and eclipses. No matter how philosophers differ among themselves, they at least agree on the conclusions of geometry.



GALEN IN THE MIDST OF OTHER PHARMACOLOGISTS (FROM A MANUSCRIPT EDITION OF DIOSCORIDES ABOUT 500 A. D., VISCONTI: *ICONOGRAPHIE GRECQUE*. PARIS, 1808).

1. GALEN. 2. CRATEVAS (fl. 80 B.C.), AUTHOR OF A *MATERIA MEDICA* WHICH HE DEDICATED TO MITHRIDATES, KING OF PONTUS. 3. DIOSCORIDES. 4. APOLLONIUS OF MEMPHIS, WHO LEFT A WORK ON BOTANY AND APPARENTLY NAMED "DIABETES". 5. NICANDER (fl. 198 B.C.), PHYSICIAN, NATURALIST AND POET, TWO OF WHOSE POEMS ON DRUGS, "THERIACA" AND "ALEXIPHARMACA," DEDICATED TO ATTALUS, KING OF PERGAMUM AND QUOTED BY GALEN (xiv, 239, 265) ARE EXTANT. HE WAS AN EXPERT ON POISONS, PARTICULARLY SNAKE VENOMS, AND HIS DIVISION OF SCORPIONS INTO THEIR DIFFERENT SPECIES IS STILL HELD. FROM HIM MITHRIDATES DERIVED CONSIDERABLE OF HIS KNOWLEDGE, THOUGH HE AND ATTALUS ALSO EXPERIMENTED ON CRIMINALS CONDEMNED TO DEATH IN ORDER TO DISCOVER ANTIDOTES (xiv, 2). ACCORDING TO GALEN, MITHRIDATES TOOK SO MANY ANTIDOTES AS TO MAKE HIMSELF IMMUNE TO ALL POISONS. 6. ANDREAS OF CARYSTIUS, WHO WROTE ON *MATERIA MEDICA*, PARTICULARLY POISONS, AFTER THE MANNER OF NICANDER; HIGHLY LAUDED BY DIOSCORIDES. 7. RUFUS OF EPHEBUS.

ied geometry. Geometry demonstrates its first theorem by apriori reasoning, its second from the proof of the first, and thus continues to add one proposition after another, using all

⁹Though this is taken from a later treatise, he tells us frequently that similar arguments were developed in his work on Scientific Reasoning, and since this was written in Egypt, it comes at least in part from this time.

I decided, therefore, if conclusions in connection with the cure of disease were thus grounded, physicians would manifest an accord like that of geometers, though it would require learning at the very beginning the meaning of every term and what undemonstrable propositions, commonly called axioms, will be accepted, like for instance, that a line contains only length, but not breadth; when two things are equal

to a third, they are equal to each other, etc.

Seeking, therefore, an axiomatic ground principle in connection with the cure of disease, which would be generally acknowledged, he hit on, and adopted (x, 761 *et seq.*), the Hippocratean "Contraria contrariis curantur." "Who is ignorant," he says (xi, 167), "that contraries are the remedies for contraries. This is the opinion not only of Hippocrates, but everybody. Even animals when they feel cold hollow out caves for themselves, and when suffering from the heat bathe in cold water."

This represents one of the important axioms on which he hoped to base a logical method of cure. He did not, however, as has sometimes been thought, rely on this alone, but insisted that every theoretic conclusion, even though it be logical, be proved by experiment. For instance he distinctly tells us (x, 29):

The proof of correct treatment is based on two criteria, reason and experience. If someone asks why we give cold water to a fever patient, we answer for two reasons: First, on account of the nature of fever, and the nature of cold water [logical contraries]; second, on account of experience, because in this particular disease, under similar circumstances, cold water has been found to be beneficial.¹⁰

¹⁰ It is remarkable the similarity of Descartes' ideas relative to the teachings of philosophy and geometry in the development of new truths. With the desire of attaining to all the knowledge of which his mind was capable he sought first the proper method of determining certainty (MAHAFFY, Descartes. Edinb., 1902). He had studied a little, when younger, in logic, geometry and algebra, three sciences which seemed likely to contribute something to his design. But he found that logic at best was only of use in the communication, not in the discovery of truth, and was so made up of real and useful truths, mixed with false and doubtful principles, that they were as hard to separate as to extract a statue of Minerva from a block of marble, not yet rough-hewn.

While the long chains of simple and easy reasons geometers employ in arriving at their most difficult demonstrations, made him fancy that all things which are the objects of human knowledge are

During the five years, therefore, spent as a student in Alexandria before entering on his marvelous career, Galen applied himself to the study of geometry, astronomy, philology, philosophy, and the logical foundations of medicine and writing on all of these subjects, published papers or books aggregating 600,000 words, or about three octavo volumes.

Of these compositions the principal, and the one of which he remained inordinately proud the rest of his life, quoting it in almost every subsequent book, was his great treatise on Scientific Reasoning, or Inductive Philosophy, in fifteen books or rolls. It has been lost, but by taking cognizance of the references by Galen himself, and subsequent writers, a general idea of its scope and contents is obtained.¹¹

It was a dissertation on prior and posterior analytics (syllogisms and demonstration), in which, by the analysis of the

similarly interdependent, and that, provided we abstain from assuming anything false, and provided we observe the correct order in deducing one from another, there is none so remote that we cannot reach, and so hidden that we cannot discover it. The axiom with which he began, and on which he hoped to base all knowledge was "Cogito, ergo sum," I think, therefore, I am.

On account of Galen being no longer read or studied, the credit for the discovery that mathematical certainty is the highest the human mind easily grasps is unjustifiably given to Descartes and Spinoza, while it is quite evident that Spinoza took the idea from Descartes, and medical student as he was, the latter got it from the Pergamite.

¹¹ In this exposition, I have combined my own with the ideas of von Müller (Ueber Galens Werk vom wissenschaftlichen Beweis. *Abhandl. d. k. bayer. Akad. d. Wissensch.*, 1895, I.CI. xx, Pt. II, p. 405, and *Berl. Philologisch. Wchnschr.*, 1896, No. 30, Sp. 934), who through his meticulous search almost makes it live again. Von Müller believes it was written in his native city between the ages of twenty-eight and thirty-three, shortly after leaving Alexandria, but as I showed in a paper last year (Galen's Discovery and Promulgation of the Function of the Recurrent Laryngeal Nerve. *ANNALS OF MEDICAL HISTORY*, 1926, VIII, 176) he was then so occupied with anatomy and surgery, that I am persuaded he brought it home from the Museum, and at most only added to or revised it in Pergamum.

different kinds of premises in regard to their practical value, he endeavored to carry proof to the limits of mathematical certainty. His slogan throughout was truth, utility and results. In his elucidation he uses the fourth figure of the syllogism, which he is given the credit of inventing. Though he frequently speaks of the method as new it was apparently induction as described by Aristotle carried further and particularly applied to medicine.

In the first two books were treated syllogisms and knowledge following the principles of Aristotle and Theophrastus with polemics against the Stoics, Skeptics and others, somewhat similar to, but more at length than, the one we have quoted. In the third and fourth he analyzed different kinds of premises in regard to their practical usefulness and demanded that they be evident either to the mind or the senses. The Thessalians, for instance, insisted that the communities (the conditions of strictum and laxum) on which the sect was based were apparent to the senses; he demonstrates this is untrue (x, 35).

In the fifth, sixth and seventh he considers the special senses, particularly sight, and goes somewhat into their anatomy and physiology. For this he carefully dissected animals' eyes, studied the muscles of movement, the parts and layers of the eye-ball and endeavored to determine the ones responsible for vision (iii, 759 *et seq.*). Unfortunately, though his anatomy of the muscles has stood the test of time and was a great advance over previous knowledge, he erred in concluding that vision was in the crystalline lens.

In the eighth was a criticism of Aristotle's notion of time. He had scarcely ever anything but commendation for Plato, but took delight in contradicting the Peripatetic. In the thirteenth he considered the atomic theory to which he was violently opposed. He gives credit to Leucippus for its origin, and Democritus for its stable foundation (i, 413, 491; xix, 228), but discusses it principally from the viewpoint of Asclepiades, the progenitor of Methodology.

And in the fourteenth, he dealt with Asclepiades' explanation of digestion on mechanical grounds in contrast to organic, which he proved to be ridiculous (xv, 247; ii, 165). The Methodologists taught that the body was a fortuitous combination of atoms, that there was no intimate relationship between the different parts, and that the only function of the stomach was to separate the food into sufficiently small particles to pass through the channels between the atoms. For this he was obliged to resort to animal feeding experiments which he carried out particularly on pigs (ii, 155), on account of their physiological similarity to man. How far he reached with these various investigations in Alexandria we do not know, but between his work then and later in Pergamum and Rome he added sufficient to knowledge to deserve the title of the Father of Experimental Physiology.

It is evident from the foregoing that even at this early age he recognized his own ability, and like certain of his illustrious predecessors and successors, was making definite plans for his later greater accomplishments, especially towards the elimination of sects and the refoundation of regular (logical) medicine. Disgusted with the stagnant philosophy of the Sophists, he created and developed induction, which promised practical additions to knowledge. It proved even more enlightening than he anticipated, and finding it required research and experiment, to these he devoted himself, a magnificent enterprise worthy of his master Aristotle, and of greater merit than that of our modern philosophers, Francis Bacon, who only pointed the way, and Descartes, who only carried out his investigations theoretically.

On account of limiting ourselves to the scientists, we have omitted a number of the eminent and well known in other lines, and it appears to be worth while to recall in passing two other celebrities of the school who quoted freely by Galen throw some light on his intellectual habits apart from work.

Theocritus (*fl.* 260 B.C.) was the father of

idyllic poetry, on account of whose birth in Syracuse, Milton in his *Lycidas* invokes the Sicilian Muse. Galen cites him in connection with a pretty fable of Aesop on the lark (xii, 360), and elsewhere. That the Pergamite was an ardent reader of all the poets is evident from his numerous quotations from Homer, Hesiod, Sappho and the Athenian dramatists.

Cleopatra (*fl.* 55 B.C.), who though she may not have attended the University, was taught by its teachers, and could not help but be influenced by its proximity. We mention her first on account of the fact that her knowledge of at least the weak points in human nature was decidedly above the ordinary, and she stands at the head of the class in which she has had thousands of competitors, the art of fascination; secondly, she is supposed to have written two works on medicine, one on cosmetics, which is lost, the other on diseases of women, which has survived¹² and she was not only quoted by all the quacks and beauty doctors of the

next several centuries, to whom her name on a box of powder or salve meant a fortune, but by many physicians of repute, like Galen, who believed she had special secrets of beauty, and cites some of the recipes parading under her name for curling and dyeing the hair (xii, 404), though he was in general opposed to this sort of prescribing (xii, 439). Like many of the great literary men our author was carried away by her career, read apparently everything written about her, and it is from his pen we have the complete story of her death through the asp (xiv, 235).

Recently this story has been questioned by skeptics on the ground of its extraordinariness as a meditated mode of death. A further narration from Galen (xiv, 237), however, removes this ground, 'for among other customs which he describes as having witnessed in the great Alexandria, as he calls it, "is the quick and humane manner of executing a condemned criminal by placing an asp on his breast and forcing him to walk about in order to urge its prompt action."

¹² Neuburger, M. *History of Medicine*, trans. by Playfair, London, 1910.



[From *Les Sonnets du Docteur*, 1884.]

THE EVOLUTION OF THE THOUGHT OF ARISTOTLE

I. THE PLATONIC SOCRATES AND THE PLATONIC ARISTOTLE

By JONATHAN WRIGHT, M.D.

PLEASANTVILLE, N. Y.

IT is quite impossible to get a proper historical apperception of Aristotle, his philosophy or even his biology and physics unless we go back to Socrates. It is true we are not to suppose that Socrates was the only shaper of Platonic thought, but he is the one Plato tells us most about. It is probably true that Plato drew his inspiration from that fermentation of thought which succeeded the era of the nature philosophers and which perhaps was initiated by them. They are the shadowy protagonists of the marvelous sixth and fifth centuries, but the outlines of their cosmical doctrines, such as any one knows anything about, are well known even to the novice in the history of the thought of our civilization. The student finds them in the prefaces of his textbooks and in the introductory chapters of more extended treatises on the subject and it is not worth while to occupy space here with going over the patchwork, made from the scanty fragments culled from others or recorded of the wise sayings of the Greek nature philosophers, but if emphasis is to be laid on the beginnings of the thought of Aristotle we must say something of what through Plato he derived from Socrates.

We are at once confronted with the question I have discussed elsewhere¹ more or less incidentally as to how much the Platonic Socrates was a real Socrates. While few have gone so far as to try to make us believe that Socrates was little or nothing more than the creature of Plato's brain, there has been, almost ever since Aristotle, an impression that the legend of Socrates grew out of the necessity Plato felt of veiling his thoughts for art's sake or for the sake of his own safety in the turbulent politics of

Athens in which he was born. Plato himself was responsible for the legend of Socrates, yet the doubt never existed in the minds of those who entertained this in antiquity or in more modern times that there was a real Socrates who drank a real hemlock and died a real death for pressing doctrines he held upon the youth of Athens. Lovers of Socrates, and there have been thousands of such in every age of enlightenment since Plato wrote, those who believe his doctrines were as divine as Plato makes them and his personality as lovable, will be pleased to find one so competent as Professor Field of Liverpool University has taken the view² that while Plato for the most part lays his own views in the mouth of Socrates and though doubtless Socrates had not given expression to some of them in life there was nothing which distorted the real Socrates. Field remarks that it is very doubtful if Socrates, as Diogenes Laertius tells the story, repudiated what Plato said of his opinions in the dialogues, for Socrates probably was dead before any of them were written, but it may easily be suspected that Diogenes told this story to epitomize the opinion of some tradition of the real Socrates that he was not the kind of man in life to originate any of them. Possibly Field would consider this suggestion of no weight, but these old writers had a way of doing such things which is very disconcerting to later historians. It is a habit which raises suspicions that are often unfounded otherwise. However that may be, Plato pictures him as no idle and quarrelsome babler of the market place. In the "Phaedrus" he lays in the mouth of Socrates what seems to be the origin of Aristotle's Unmoved Mover,

¹ *Scientific Monthly*, April, 1925; *M. J. & Rec.*, Feb. 18, 1925.

² Field, G. C. Socrates and Plato in post-Aristotelian tradition. *Classical Quarterly*, 1924-1925, XVIII, 120 and XIX, 1.

yet in the "Timaeus," which is thought to be entirely Platonic, it is implicitly adopted. Galen makes some references to Socrates but on examining them there does not seem to be anything which might not have been derived from Plato's own portrayal of him. There is very little indeed outside of Plato and Xenophon of direct testimony as to Socrates, but these disciples of Socrates were nearly of an age and Xenophon probably died before Plato. The suggestion of Xenophon's having copied the legend of Socrates from Plato is improbable enough on that account, but it is incredible he would have made such a poor Socrates out of the divine image Plato left. Xenophon at least was no fool and could have made a better copy if he was a copyist. What he lacked was the insight of Plato. Even in Galen's day it seems these were the only or almost the only sources of direct testimony as to the real Socrates. The difference is in the biographers. In either tale Socrates was great and Xenophon's "Memorabilia," according to Galen,³ was not the last of his works and hence must have been written long before Plato's death. Xenophon tells of Aristophanes making fun of Socrates, but as we read the "Clouds"⁴ we find him apparently loaded with ridicule for various physical studies which Plato makes him ridicule himself in connection with some work of Anaxagoras. Like Pythagoras and many other great moral teachers Socrates wrote nothing. Though Galen more significantly for us complains that many of the writings of eminent men before his day had perished, at least we can see that Galen regarded Socrates as a very real person, but we are jarred a little by Aristophanes giving him a bit of color on the stage during his life for recognition by fellow townsmen who knew him well, which does not accord with that of the image we find in Plato and Xenophon.

More than two hundred years before

³ Claudii Galeni Opera Omnia. Ed. Kühn. XVIII, p. 301.

⁴ Aristophanes, Oxford ed.; Clouds, 225 seq.

Galen, Cicero⁵ remarked on the interest Socrates took in numbers, geometry and harmony, and something as to his interest in physical science otherwise. Of these Socrates speaks far less obscurely in Plato's dialogues than any expositor of Pythagoras we know. Aeschines wrote of him, but of this we have nothing. Plutarch a hundred years before Galen in quoting⁶ unfavorable notices of both Plato and Socrates from Colotes, the Epicurean, thought he was speaking of a real man. Plutarch too accepted the legend, such as Plato and Xenophon give it to us, as history and though we cannot always trace back to them the anecdotes and opinions of Socrates as he gives them, there is nothing in them inconsistent with either of their accounts. In Plutarch's essay on Socrates' *demon* we recognize much which is derived from them and perhaps a better acquaintance than my own with Plato and Xenophon might find all in their writings so far as Socrates is concerned, but I cannot say that I do. Field thinks Plutarch regarded Socrates as a sceptic, but Jowett declares he is nowhere so represented and though Plutarch quotes him as saying he is a citizen of the world he rather prides himself on being a citizen of Athens and confesses to an inability to find happiness elsewhere. Opposite as these interpretations are in appearance, they are manifestly reconcilable. Socrates leaves many a subject after long discussion in the air declaring he knows not what to make of it. Whether or not that is being a sceptic depends on the critic. A man might be all his life a devoted citizen of Athens and yet entertain doctrines and views so cosmical in nature as to be a man of the world in that sense. I may be pardoned for introducing matter so banal, but it is well to give a specific example occasionally how historians boggle a subject with splitting hairs over a definition.

⁵ Cicero. Tusculan disputations. Ed. Müller. v, 4, 16.

⁶ Plutarch: Against Colotes, the Epicurean. Morals, Goodwin Trans. v, 341.

Plutarch refers to Socrates and Plato as both regarding essences as separable from matter and to Aristotle as making no objection but believing they are never separated from matter. All the difficulties in the theory of forms arise from Plato's separation of them, Aristotle declared according to Plutarch, but a modern critic insists Aristotle misinterprets his master⁷ with whom, as Field remarks, he had for twenty years the opportunity for daily familiar and personal discourse. As I read Aristotle, sometimes he points one way and sometimes the other and this very wavering shows the master's magic influence. We can readily believe that the personality and the familiar discourse were at least as moving as Plato's writings. We should know enough of the human mind and the human heart too to believe Aristotle at times was ready to let what we regard as common sense rule and at another he permitted the memory of the master to convince him the Cheshire cat could depart and leave its smile behind. In reading the "Philebus," one of Plato's later dialogues, we get a good deal of the mixture of the abstract and the concrete and in the "Timaeus" we are carried away by the mingling of the corporeal and the incorporeal in the constitution of the human soul. Against this too Aristotle rebelled, but judging from one's own experience with the art of Plato, what must one surmise of the effect of daily intercourse with such a man? No wonder after the Master's death even Aristotle's mighty mind could not always pursue its own course unmoved. It is asking too much of us that we should believe the whole difficulty hangs about a word this time, as Mabbott does. We may not be fully aware just what *χωρισμός* means, but we may be sure Aristotle's vacillation hung about no spoken or single written word of Plato.

If we have the text of Plato and that of Aristotle, however mutilated, to compare with one another and if from the comparison we may draw some conclusions which may

⁷ Mabbott, J. D. *Classical Quar.*, April, 1926, xx, 2.

fairly be said to have originated in our own minds as to the Platonism of Aristotle, we have no such resource to aid us in the matter of the Platonic Socrates. Field declares that the post-Aristotelian commentators had no sources from which to draw the character of Socrates other than Xenophon and Plato and Aristotle himself. As to direct source we may rule the latter out. Socrates died fifteen years before Aristotle was born. Was the impression Socrates made on his fellowmen so evanescent as to leave no trail, so limited as to be found only in the writings of two at most of his disciples? for the character these give him was not that given to other men of his time. Was his death itself so unnoticed that only Plato elaborates it? The question naturally arises, are all semi-divine men thus made? Jesus of Nazareth, Buddha, Mahomet, Pythagoras, Zoroaster? Has humanity made not only its own gods, but its demigods? The written word we may analyze and criticize, but the spoken word has wings for the time it is true, but which soon bring fame to the earth and oblivion or cast it far beyond analysis and criticism into the vague air of tradition. We need not wonder at the inference some recent critics like Dupréel have drawn in regard to Socrates. We need not quote Galen or Olympiodorus, when we have Plato. Their surmises can have no other source than our own that Plato, if he distorted Socrates at all, does not falsify in any way the real Socrates, but in fact gives prominence especially to those views of his master which he valued. Was Aristophanes, his contemporary in what for us was a small city before an audience which knew well all notable men and their thoughts, so bold as to attribute ideas of cosmogony to him he never held? Socrates in the "Phaedo" explicitly disclaims, and with some contempt, any insight into the ideas of Anaxagoras, who probably brought to Athens the views of Ionic nature philosophy, but in the "Timaeus," written, it is said, by Plato many years later and probably long after the death of Socrates,

there is a good deal about cosmogony placed in the mouth of Socrates and Cicero speaks of his interest in it. We have the evidence of Plato's genius and his versatility in his works and we have every reason to believe these characteristics were of that exceedingly rare kind which lasted as long as the man lasted.

I see no considerable reason to believe that Socrates had any marked influence upon the physics of Plato, but there is no reason against the view of Plutarch that he may have played a part in the elaboration of his doctrine of Forms or Ideas. We may well suspect that these far back in the workings of the human mind began with primitive man. Their embryonic stage has been observed by modern ethnologists and sociologists. The savage draws no line between the abstract and the concrete. He lends corporeality to all incorporeal concepts. Through how many minds before Plato this spirit had been distilled we do not know, but we do not have to go to Asia Minor for that. It may have descended to him through Socrates or some other, but sure we may be he gave to the Forms and Ideas shapes of his own.

So much for the moment for the Platonic Socrates. As to the Platonic Aristotle Ross in his introduction to his text of the "Metaphysics"⁸ lays much emphasis on the debt Aristotle owed to Plato. To this I have adverted elsewhere and I shall have more to say of it in connection with Ross's book on Aristotle and his doctrines. These, together with Jaeger's book⁹ on the evolution of the mind and the philosophy of Aristotle, form a body of recent opinion on the indebtedness of Aristotle to Plato, which cannot be ignored, though it is not universally and unqualifiedly accepted. The work of Ross appearing in England almost simultaneously with the publication of Jaeger's book in Germany gives added weight to the recog-

nition of much Platonic thought in Aristotelian philosophy. It does not often happen that scholars so wide apart and in countries so lately at war with one another, pouring over pages carefully perused and commented upon by students as learned as themselves for two thousand years and more, come finally and simultaneously to conclusions so near together in the face of so many in the past so vastly and variously diversified. They set about it too each in his own way. Ross edits the text of the "Metaphysics" anew and in the opinion of modern critics far better than it has ever been done before. He supplies it with a valuable introduction and copious notes. He then writes a book on Aristotle and his philosophy of no mean merit. Jaeger in Germany, notoriously the land of books too ponderous and pedantic to be read elsewhere with pleasure, produces one on Aristotle as learned as those of any of his countrymen, but one which it is actually a pleasure for a Greek student to read anywhere. War is the father of all things they say, but this is one of the noteworthy things, if war did it.

He sets out to study the life of Aristotle in its reflection in his works, but he neglects no sidelight he can throw on it from other sources. He observes how the works are responses to his character and its development. This was affected by the environment and the opinions of his contemporaries, especially those of Plato and his school. He does not forget the influence and the opinions of his earlier predecessors, but to these latter is ascribed less influence than one has been accustomed to suppose and one may well imagine that this impression the reader gains is due largely to the author's preoccupation with the influence of Plato. The direction of the impulse Aristotle gave to subsequent philosophy was not due directly to these influences as much as to those of his immediate environment in his young years and his reaction to them. Jaeger insists that Aristotle has never been properly presented from this point of view of mental evolution and he

⁸ Ross, W. D. *Aristotle's Metaphysics*. 2 Vols. Oxford, 1924. Aristotle. N. Y., 1924.

⁹ Jaeger, W. *Aristoteles, Grundlegung einer Geschichte seiner Entwicklung*. Berlin, 1923.

makes that the guiding thread of his own work. This neglect has been due, he thinks, to the devitalizing influences of a pure scholasticism, both oriental and occidental, but he makes no especial allusion to the part German scholasticism of more recent date has played in such devitalization. He traces it as far back as Andronikos and his school of which, as the tenth in succession to Aristotle, he was the head in 58 B.C. They pursued the study of the form of the thought with no attention to its origin and growth. They lacked the historical sense, without which all thought becomes conventional and stereotyped and sterile. This in any event would later have been much handicapped by the loss of his dialogues and letters.

Cicero knew¹⁰ the "Eudemus," but as Jaeger remarks, all of Aristotle's works nearly perished and those of Epicurus and the Stoics did perish, he thinks, because they did not assume the conventional form of dialectic in the dialogue. I do not see much force to this remark since the dialogues of Aristotle not only nearly perished but did actually perish. Plato thought this form of no importance and we may be permitted to think he was right, in spite of the fact his own work is enshrined in deathless dialogues. It was thus his philosophy was perpetuated, but he abandoned it more and more after the figure of Socrates receded from his recollection and as a consequence, Jaeger thinks, the philosophy fails to engage the attention of any but exceptional men, the purely philosophical men. Jaeger, I think, forgets here what he elsewhere alludes to. As a matter of fact it is only the exceptional man who can teach philosophy in the form of dialogue. All readers have revolted from that form, except as it was shaped by the hand of Plato himself.

At the entrance of Aristotle into the Academy in 367 B.C. at the age of seventeen, at a time when the personal impression Socrates had made on Plato had ceased to

furnish us with the vivid and soul-stirring dialogue of his early period, we find nevertheless through Plato the continuation of a tradition and a transmission of doctrine from Plato's now all but legendary master. He had been dead thirty years when Aristotle fell under the intellectual sway of Plato. Never before or since in the history of thought has there been recorded such a marvelous succession of closely knit minds in the transmission of philosophy from a chaotic past to schools which have taught it to our more immediate predecessors. The contact of Plato with Socrates could not have been as fruitful and as intimate as that of Aristotle with Plato, but the latter has appeared much more the disciple of his master, partly for reasons Jaeger has alluded to. He went to Socrates when he was eighteen or twenty and Socrates died by the cup when Plato was twenty-eight, while Aristotle was with Plato twice as long under terms of at least much more conventional intimacy. He was nearly forty when Plato died. Aristotle is the sole man of imposing mind who grew up so long intellectually in the shadow of another intellectual giant. For twenty years he lived in that of Plato. No man before or since of original and constructive mind in the higher strata of thought ever did that. Plato's contact with Socrates, as we have just seen, was far shorter and so far as we know far less intimate, though exciting far more reverence in the pupil, even if we agree that the pupil has shaped his image for us of later generations. All this Jaeger makes us see, acknowledging Plato's infinite genius and Aristotle's finite mind. It was Plato's mind, tense as a bow, which with elastic velocity worked the mind of Aristotle, to translate the author's words almost too literally. He was carried away by this in Plato—the mighty sweep of his mind and the high art of the exposition of his thought, which Socrates, the midwife of thought, had taught him, and it was this the young Macedonian, straight from Stagira, strove in his earliest works, his dialogues, to imi-

¹⁰ De divinatione. I, 25, 53.

tate in the fashion of the Master, like the other pupils, "for many long years" under his guidance.

Plato's philosophy was the ground work of his own; it was the raw material out of which he hewed his own forms of thought and however much he altered the original material into as great an originality of new forms, the contact with Plato in his younger years remained the guiding principle of his later ones; even his last works show it. The dialogues are lost, but their close relationship in form, spirit and views to those of Plato is the first and nearest and most convincing proof of the deep impression made on Aristotle by the tradition of Socrates immortalized by Plato. The trace of it is never lost even in the latest works left to us. Starting with this his own evolution is in itself a part of Aristotle's conception of the phenomena of Nature seen in what we still have of him, but the excision of Platonism by his followers left only one half of Aristotle to their later successors. Much of the Socratic spirit had evaporated from the Academy by the time Aristotle entered it. The "Phaedo," "Gorgias," "Republic," "Symposium," mark the peak of it and by that time much had changed and the earlier works had passed into the age of vanishing things. Dialectic had driven much of the artistry out of Plato and this he had from Socrates and this Socrates himself never lost, we infer.

The natural development of Plato's own philosophy had driven much of the early charm out of the later dialogues of the Academy instruction when Aristotle came under it. What Socrates had been to Plato and to the earlier years of his school Aristotle knew only from reading and from the tradition which after forty years was still vibrant with the soul and spirit of the Master. The earliest dialogues of Plato which portray so vividly his personal charm of manner were far in the past. Socrates already was becoming a legend. The "Phaedo," the "Gorgias," the "Republic" and the "Symposium" marked the close

of that period and the brilliant rise of another. The more pupils the Academy attracted the more Plato's schoolmaster characteristics came to the fore and those of the artist in him suffered something of an eclipse. The glow of inspiration Socrates had diffused from his sublime nature did not so illuminate the later productions of Plato. He became naturally more didactic, but scarcely more dialectic. He became even pedantic, more dogmatic, but more profound in his philosophy. The "Theaetetus," "Sophist," "Statesman," "Parmenides" are redolent of this, the "Philebus" scarcely less so, though it breathes much of the Socratic fire and charm, the last spark perhaps of the genius of Socrates we see plainly in Plato, as Jaeger reckons the chronology of his works.

It is important also to note in respect of chronology that in 367, when Aristotle entered the Academy, Eudoxus brought more exact mathematics and new astronomical thought to Athens which affected the work of the Academy and quite evidently had a profound influence on Aristotle. This resulted later specifically in his "De Caelo," though its traces are found elsewhere in his later works. But at this time the nature of Aristotle's early dialogues points unmistakably to the influence of Socrates through Plato's early works and the oral tradition of him as the incitation of the young man's labor and the model for a young man to follow. This is a stage Jaeger has made it impossible longer to forget in the evolution of the mind of Aristotle, in spite of the loss of his dialogues. The astronomy of Eudoxus may have made at this time a lasting impression betrayed later in the "Physics" of Aristotle but in this journal we may more especially note that Plato through his relations with Philistion had already become thoroughly acquainted with the theories of Sicilian medicine. The discussion of these later at the Lyceum, but probably also at the Academy in Aristotle's term there was doubtless much concerned with the doctrine of the *pneuma*

and had early much to do with Aristotle's ideas about the heart as the seat of life and the soul. Stronger than all was the impression Plato's personality made upon him. He was the scion of one of the most aristocratic families in Athens, one which had Solon for an ancestor, and it is not too much to conjecture that this also had an influence on the principles of Aristotle's "Politics," but Aristotle's father was a court physician in Macedonia, he himself later Alexander's tutor. Some modern social, not to say socialistic, philosophers like Dewey view these sources of ancient political theory with a jaundiced eye, but the aristocratic trend of Plato's opinions, as seen in the "Republic" and in the "VIIITH Epistle," which seems surely genuine, is toward an aristocracy which if attained or attainable would leave no valid excuse for a democracy. It may be defined according to this testimony as consisting of those few who, by education, study or otherwise, but chiefly assisted by an inborn or intuitive capacity, easily arrive at spiritual truth. This is idealistic enough for any one's approval, but the "Politics" of Aristotle brings a more practical side to the surface and one more open to modern criticism, though difficult to refute.

Cicero considered Aristotle's dialogues of great literary merit. Neither these nor some other works of this early period except in small fragments quoted by others have come down to us. Jaeger assumes, without much authority, that both Plato in his later years and Aristotle likewise did not consider literary excellence necessary for the exposition of philosophical thought, which we may suppose is one of the pathways by which we arrive at spiritual truth. Plato's later style, it must be confessed, is often dull, to say the least, but despite some baffling obscurities and contradictions and inconsistencies in the later writings of Aristotle (the only ones we know) these never reach the stereotyped sonority of German metaphysics nor the stupidity of the precision of modern philosophy. In general Plato

at his worst never reaches such depths and Aristotle's vivacity and naïveté are almost as attractive as some of Plato's best and perhaps never so tiresome as Plato's worst. Plato reaches the highest form of art in his earlier work and later sometimes seems to strive after it in vain, which is fatal to any art, but Aristotle is never on parade even in his formal treatises. The mask of Plato, unlike the style of many modern philosophers, never hides the subject, but Aristotle has no mask. With the "Theaetetus" the Socratic form in Plato began to fade and what the subsequent dialogues gain in profundity of thought they lose in seductiveness.

We suspect Socrates had a gift of exposition which sprang spontaneous from his mind as long as he lived. Plato was fascinated by it, learned it, copied it, but it never was a spontaneous out-cropping of his mind and as the memory of Socrates' personality faded Plato lost the manner. No one else has ever acquired it. Many have attempted it. Some have escaped being grotesque and insufferable, but no one has ever succeeded as Plato did. It was the glamor of his earlier dialogues and the lingering form of them attracted the youthful ambition of Aristotle, but the works of his which have endured to our day scarcely show a trace of the early adolescent love for the Socratic method, a weapon in education which no one but Plato learned to wield with soul-satisfying skill, while the influence of Socrates' memory was fresh. As Plato gave it up finally or retained only the shadow of it, Aristotle in the end shook himself entirely free from it. Essentially Socrates was inimitable once his image had faded, as it finally did even from the loving and mighty mind of his disciple. Something of this kind happened in the evolution of Aristotle's mind. Once the workings of the mind of Plato ceased with death, Aristotle's own asserted itself. Some such scheme of succession as this appears to be the underlying basis of Jaeger's thought in the relationship of the three men. Naturally it excludes the myth

nature of the Socratic legend, it excludes the merely Platonic Socrates and visualizes a real Socrates, semi-divine.

Having had his attention drawn to Aristotle's "Protreptikos," through what Cicero had to say of Hortensius, St. Augustine was much impressed with the work, which seems to have been one alive with Plato's feeling of the philosopher's duty in the exhortation of princes to virtue. In his "Confessions" he declares it was this book turned his thoughts to the contemplation of Christ and His religion, but this was a time when all thoughts were leading there, as all roads led to Rome. Through that and the "Eudemus" Aristotle carried great weight with the Neoplatonists and through some such channel Thomas Aquinas must have been moved to the study and the interpretation of his systematic works to the Middle Ages. There is no doubt that in these ways these early lost works of Aristotle made a deep impression not only on Cicero and Plutarch but on later thought. The former had an especially high opinion of them, so high he tells his brother Quintus¹¹ he has followed him in some of his own writings. He recommends them¹² to his son for their perspicacity of style and with that frank egotism, which in Cicero is rather attractive than repellent, he assures Atticus¹³ he has been doing some writing in the Aristotelian manner himself. This form and style therefore, originating in the oral charm of Socrates, we see extending to one of the greatest of orators and to the greatest protagonist of the Christian faith in antiquity.

It is thought in the rivalry of the schools to obtain youths from noble and princely houses throughout Greece as pupils those interested were anxious to attract the attention of the great and mingled in politics at least to the extent of writing letters containing precepts of political conduct, a

method of publicity somewhat in contrast to the florid advertising in the daily papers. Such it is suggested may have been to some extent the motive behind the letters of Plato. This is rather preposterous since Plato carried this supposed advertising spirit, we would have to conclude, into writings and actions in the Sicilian affair which involved him in humiliation and almost made him a slave, for his letters, especially those better authenticated, deal with it. Such may have been the motive behind the epistles of Isocrates and such may have been the spirit which animated Aristotle when he made the attack on him, to which Cicero alludes.¹⁴ Perhaps it was one of the incentives of the "Protreptikos," if the latter was written during his attendance at the Academy. Perhaps Plato had it in mind in writing the "Republic," to say nothing of some of the dialogues, and the same may be said of some of the later writings of Aristotle or of those of any man in the earnest work of life. He writes and talks about the things in which he is interested and it is a cheap sort of criticism to call it advertising when thereby he gains his daily bread. In that sense I suppose this may have been the motive of the "Republic" of Plato and perhaps the "Protreptikos" of Aristotle, but it is not an important contribution to any sort of criticism. The claim that philosophy was the best foundation for a statesman was a doctrine in a field not likely to lie fallow among those the Greeks plowed, whether pedagogues or not. The Sophists at Athens thrived on such principles. The salient point of Jaeger's argument for us here is the indication that Aristotle, the pupil of Plato, joined with him in a competition with Isocrates for aristocratic patronage, but whether the "Protreptikos" was written then or not is not so assured, for it may have afterwards grown out of letters Aristotle wrote as an auxiliary in such competition. The weak point of this kind of reasoning is that it falls in line with our own line of thought and experience in an

¹¹ Cicero. Epist. ad Quint. frat. Ed. Müller. III, 5, 1.

¹² Cicero. De fin. bon. et mal. v, 5, 12.

¹³ Cicero. Epist. ad Att. XIII, 19, 4.

¹⁴ Cicero. Orator. 19, 62.

advertising age twenty-five centuries after that of Athens. It is not history.

We take note that in early days Aristotle stood shoulder to shoulder with Plato in a rivalry in politics, if not in pedagogy, with Isocrates. The two philosophers were affiliated with the old aristocracy, Isocrates courted the aristocracy of wealth and commerce. They claimed that the highest ideals of man lay in the contemplation of pure science and philosophic truth, while Isocrates was an utilitarian, a courtier for the favor of the *nouveaux riches*. We are familiar with the sentiment of righteous protest against the blocking of research for things not immediately of practical use. We know well that even utilitarian science would quickly perish with a non-utilitarian science thus obstructed, Plato and Aristotle held the view that it is far more important to educate the soul of man to understand the thoughts of men and to be open to the urgings of philosophy than how to chase the mighty dollar of their day along the shores of the Middle Sea and out beyond the Pillars of Hercules in the argosies of trade and in strife with men for material things. Socrates and Plato had long insisted that the luxury and arrogance of these old pirates, prototypes of the new ones of whom we are so tender as to speak only in whispers or in allegory, spelled ruin for the state and ruin for humanity. We can at least deep down in our hearts cherish, unuttered by our lips, the pious hope they smote Isocrates hip and thigh. All this train of thought would be quite aside from our purpose here if we did not immediately turn to the opening chapters of Aristotle's "Metaphysics."

All men are by nature stimulated to the acquisition of knowledge, but we should seek scientific knowledge from no other actual ground of utility than that which ministers to the inward satisfaction of the soul in its pursuit and attainment and not to the satisfaction of the senses. They indeed give knowledge, but wisdom never. There is a difference between art and wisdom,

between useful knowledge or skill and wisdom. The latter leads to a higher satisfaction as well as lights the way to useful knowledge. Knowledge pursued for its own sake is more truly wisdom than knowledge desirable for its results (Ross). This is the essential of the matter of the first two chapters of the "Metaphysics" of Aristotle and it can scarcely be overlooked that it betrays the ideals he cherished all his life and heired from his days of Platonism, as it is said to be the subject matter of the "Protreptikos." The man of science who has read these first few pages of the "Metaphysics" and has not felt it moving in his soul that this is the truth has missed his vocation. He had better turn to something else. He usually does. He goes into a commercial laboratory and shuts the door behind him. If he cannot get enough out of science without being boosted by the professional booster and the petty vanity of his own flamboyant advertising nature, he has got into a blind alley and needs the consolation of the senses. The conventicles of science if he attends them with sufficient assiduity will confer on him the highest honors in their gift, but he has missed its best rewards.

It is not difficult to find this application in modern day materialism, though it partakes of the mysticism of the soul, and somewhat the same sentiments we find here in the "Metaphysics." Jamblichus, the Neoplatonist, in a work of the same name but in somewhat differing phrases, quotes from the "Protreptikos" of Aristotle written long before under the inspiration of Plato. The word he uses for the love of knowledge for itself is peculiar, *αρετηνολις*. We find it in the "Metaphysics" of Aristotle and Jaeger thinks it was probably this word which was used in the "Protreptikos" of Aristotle.

When we attempt to analyze this feeling and seek its source, it seems to be the vista of causation behind and the vision of sequences ahead give the pleasure as they in turn open out to the intellect of man, but after all is said, there is at the bottom,

as in all the higher pleasure, that of music for instance, something mystical, something inexplicable. The mechanical, materialistic benefits the researcher or the philosopher or the musician receives are not to be compared to this highest gift of all. It was Aristotle emphasized it, not only here in the "Metaphysics," but in the field of biological science¹⁵ he further animadvert upon it. In the "Protreptikos" Jaeger also surmises from its fragments, there was discourse dealing with the difference between exact knowledge such as the geometer has and that of the carpenter. This corner of thought began thus early to occupy his attention, perhaps originating in Plato's distinction of knowledge and opinion, and was to be much more largely opened in Aristotle's later works. So too with ethics and politics, the ethics of the political builder is one thing, that of the philosopher another. For Plato

straight was straight and good was good, absolute, and so it stands in the "Protreptikos." Aristotle's later experience included not alone his observation of Plato's disastrous Sicilian adventures, but he had adventures of his own which taught him there were two kinds of straight lines, one of this world and one of an ideal world. After the death of Plato Aristotle fought for a place in the sun under the conditions obtaining in the former, for the practical physics of the arts, for the practical ethics of good works in contradistinction to the absolute. In such struggles all philosophers' sympathies will be with Plato and they have a right to insist that where Aristotle sometimes differs from him in ethics and politics, and other things perhaps, the Empirics must turn constantly to Platonic ideals as systems of reference for the practicalities. Without this pure science empirical science perishes.

II. THE DRIFT OF ARISTOTLE FROM PLATONISM

If, as I have attempted to show in Part I of this paper, we find reason to follow Jaeger¹⁶ in his exposition of the intimacy of thought of the young Aristotle with that of his master Plato in regard to ideas of the difference between pure and applied science, it should be further remarked that the germ of it is to be found in Platonic dialogue.¹⁷ If in later years Aristotle became the champion of the latter, though he never faltered in his devotion to the former, the Platonic view, pure and simple, is found in the "Protreptikos," that the senses at best only mimic the exact and absolute of the ideals. As has been specifically pointed out for the physics of Plato he is far from consistent in different dialogues in his esteem for them. It is not always being entirely accurate or frank simply to say Aristotle follows Plato in this or that. The writings of both contain contradictions and inconsistencies. It may have been in some lost

treatise Aristotle betrays himself as at first an adherent if not an advocate of the Platonic Ideas, defining the Idea as "the exact in itself," but in this instance he does not seem to have been inconsistent at all in the late evolution of his thought in entirely rejecting their essential implications. The mention, however, of this early leaning towards them serves to illustrate the imaginations and early aspirations of a gifted youth feeding at the magic tables of Plato spread for his disciples, but here we must try to follow these to a goal of his own beyond, after Plato's death in 357 B.C.

Plato was dead and the troops of King Philip had laid waste the home province of Aristotle, the house of Nichomachus in Stagira and the other cities of Chalcidice after the latter's death, but the family belonged to the faction of the Macedonian king to whom Nichomachus had been physician and at Athens at the time of the death of Plato Demosthenes was thundering against Philip and inflaming the minds of the democracy, with an impotent patriotism perhaps, but sufficient to make the town too

¹⁵ Aristotle. *De part. animal.* 644 b. *seq.*

¹⁶ Jaeger, W. *Aristoteles, Grundlegung einer Geschichte seiner Entwicklung.* Berlin, 1923.

¹⁷ Philebus, 56 d.

hot for Aristotle, we may easily infer. Somewhere in the level Plain of Attica there once stood an altar, which the Neoplatonists supposed Aristotle erected and which Murray and others besides Jaeger have accepted as a likely tradition. The latter imagines that when he fled from Athens or afterwards he wrote an elegy declaring the monument was to a man it was not for bad men to praise, to one who had taught goodness in his discourse and had pointed out in everyday life it was possible to achieve happiness through virtue. Plato himself might have erected such an altar to Socrates and the political atmosphere at his death might have been scarcely more hostile than for Aristotle at this time, who as a foreigner could never have become a citizen of Athens and as a Macedonian was not only a barbarian but then at least a member of an unpopular nation of them. It would not seem just the time for such an one to erect an altar to an aristocrat. If he really did honor Plato in this way, it was not until the Macedonians had beaten the Athenians to their knees, we have every right to suspect. As a foreigner he could own no land and must have had permission from some one or the state to erect it at this time. However, the story at least would seem to show that the Neoplatonists cherished the legend that Aristotle revered the memory of Plato after death. The elegy in which reference is made to it is said to have been dedicated to Eudemus, an early friend, whose death he mourned and after whom he named a dialogue.

It is not necessary here to go into what is at best a matter of surmise as to Aristotle's break with the Academy after Plato's death. It seems it must have been inevitable that as the Academy grew and Aristotle's slowly developing genius manifested its triumphant and immense superiority, there were jealousies and heart burnings and offense given and taken by those whom the Master honored or did not honor and who hoped to succeed as head. There is no improbability that the situation within the Academy became an

impossible one for Aristotle on Plato's demise, but little beyond what may well be faint traces of ancient gossip remain to us of it. Aristotle's withdrawal from the school may very likely have been imperative from other reasons, when Plato's influence in influential circles was buried in the grave with him. At any rate despite the warm heart which is betrayed in his will and various other records that scholars have wrested from the sidelines of ancient literature, he broke his ties with the Academy and the Academicians. He went to live in Asia Minor in the Troad at Assos and there with some other old pupils of Plato set up a school under the protection of Hermias, Lord of Atarneus, a titular Persian dependency, whose niece and adopted daughter he married. Hermias, secretly allied with King Philip and plotting against the Persian King of Kings, was trapped and killed under torture. Apparently before this tragedy Aristotle had become the tutor of the boy Alexander at Pella. After it he wrote a touching elegy on Hermias, to whom he was warmly attached. This mere outline must suffice here. Son of a court physician to King Philip, son-in-law of the ruler of a Persian province or district, pupil of Plato, the aristocrat of Athens, tutor of Alexander the Great, when one reads his political treatises the influence of these environments is not to be forgotten. When one reads his "Ethics" and sees how they differ from those of Socrates one must think of Aristotle's life tossed about by the politics and politicians of Athens, who were little guided by the ethics of the Platonic Socrates and had put the real Socrates to death, and by the wiles of King Philip, who had no ethics at all and by Alexander, who claimed to be a god and above such trifles.

Aristotle was thirty-seven when he left Athens and forty-nine when he returned. In that epoch of a man's life he does his best observing if not his best thinking, but to all appearances during this period Aristotle did no writing at all, which has reached us, unless it may have been the elegies men-

tioned and some correspondence of which traces have been thought to be found. His great works began after this, it is supposed, at least those with which we are acquainted. We can appreciate the strength of the inference that it was largely during this period of vicissitudes beyond the walls of Athens he acquired that knowledge of life as it is lived outside of cloistered seclusion, which we see tempering his youthful idealism in the "Nichomachean Ethics," the "Politics," and the "Constitution of Athens." But at second hand by the means of the fragments of dialogues and perhaps of the other lost treatises of his youth, especially by what we know of the "Eudemus," as to the ethics, we see how these grew out of the ethical talk of Socrates in the dialogues and his familiarity with the "Republic" of Plato. No wonder he drifted somewhat from the ideals there exposed during that twelve-year period away from the magic of Plato's personality.

But he gained something else along the shores of Asia and the Chalcidice. He gained his biology. He must have begun the acquisition of it when he was a boy before, as a mere lad of seventeen, he went to Athens and to Plato on his father's death. The only reason there seems to be for ascribing the dialogue "On Philosophy" to this period is that it shows a significant break, it is thought, with Platonism, so far as one can call that a man's standing on his own feet and thinking for himself. That is sufficient in most academic circles to make a bad break indeed. It is significant, in these *Wanderjahre* of Aristotle, because at that time new ideas were entering his head. It was a turning away from the Ideas of Plato. Though at this time he wrote nothing which has survived until our own time it was at this time he wrote most of his dialogues and from that on philosophy antiquity drew for its cosmology until Andronikos published his edition of the "Physics." It was thus an immature Aristotle who supplied the Stoics and Epicureans with their cosmic philosophy. It dealt largely with that of philos-

ophers who had preceded him and contained only material in embryo for the riper works of the "Metaphysics" and the "de Anima," of the "Ethics" and the "Politics." The Academy even in Plato's time was influenced by such things coming with doctrines from the Orient and among its pupils were Chaldeans.

Now since it has been earnestly argued and so nearly proved that it was largely through the dialogues of Aristotle the Stoics and Epicureans got their cosmic philosophy, might we not suspect it was somewhat through the same source as Aristotle the Stoics got that part of their philosophy which is so markedly fatalistic? Essentially that characterizes also Epicureanism but there it is more perceptibly tinged with materialism, while Stoicism has its sublimities which profoundly influenced the evolution of Christian doctrines. To ask us to believe we derived all this through Aristotle is choking down the broad river of thought to a narrow gorge almost at its source and renders the statement that the Stoics and Epicureans got all their faith from Aristotle almost absurd. We may readily believe rivulets of oriental doctrines trickled through Aristotle's fertile mind, carrying fertility to regions below, but these were not the only channels the historian of the course of thought needs to explore coming from the Orient. There were unquestionably numerous others.

However, the Unmoved Mover was the central point in his dialogue on philosophy, but it was there a crude conception, while in the "Metaphysics" and in the biological books he works through what are plainly Platonic demiurgi in the shape of entelechies, yet the soul that dies in the "de Anima" hangs this system in the air. It may be that there is dubiety in the translation of the word *χωρισμός* as separable, but if we accept that in the passage referred to¹⁸ as imperative, the soul not separable from the body dies with it. Dividing the soul up in following Plato is not of much help. If

¹⁸ De Anima. II, 413 a, 4.

there is part of it does not die it cannot be attached to the body or, it would seem, have anything to do with another part of the soul which partakes of the body's character of mortality. Plato's idea of star souls, when pursued as far as Aristotle followed that lead in the "*de Caelo*," got him into trouble too, as did confounding the ether with fire or adding it to the four other elements, but these matters can perhaps be taken up better elsewhere and are only mentioned here to indicate the possible origin of the thought in Aristotle's mind after he returned to Athens and founded the Lyceum in 335-334.

Alexander's opening successes on the mainland of Greece had made it safe for him. He doubtless was therefore received with honor and the flattery of the supple-minded Athenians, viewing the fate of Thebes at the hands of the man's pupil and master. Antipater was the lieutenant left behind to rule Macedonia and Greece and he was Alexander's devoted friend. So Aristotle's last years in Athens would seem to have been sheltered ones and it is only in such times as this the mind effloresces and puts forth its best. Demosthenes and his party loomed more or less impotent in the background and, as a modern encyclopedist says, a gloomy tranquility reigned in Greece for twelve years until in 323 Alexander died at Babylon. In the disorders of the world which followed Aristotle had again to leave Athens and in the next year he also died.

To leave out the religious side of a great thinker is often to lose the key to his mind, but though it can hardly be said we have done so in the case of Aristotle we are left in great doubt as to just what he did believe in regard to the relations between man and his Maker. The sceptic and agnostic has ample excuse for claiming Aristotle as his brother in trouble. His wavering in later years as to the soul was not the character of the more robust but more mystical belief of Plato, which at the time of their contact he shared with him, if we are to believe the testimony of the "*Eudemus*" as to the earlier

decades. It is probably true we must ascribe to Plato the first formulation of an internal reliance on God as allied to the philosophical enthusiasm of the mind, not as the foresight of a seer, but as the realization of the deeply hidden significance as to the way things are interrelated. Aristotle it was who first connected this clearly with the problem of knowledge and belief. Out of the yearnings for these he made a kind of religious consciousness. In this sense Aristotle was a profoundly religious man. Both he and Plato regard God as the Spirit or Something higher, still higher than the mind. This is revealed, Jaeger thinks, in the fragments of the works of the early Aristotle on philosophy and prayer. Whoever has received this consecration should not with the intellect take a grasp of things, but internally should experience something and so arrive at a certain state of the inner man, always provided that the individual is quite capable of it.¹⁹

It is perhaps significant that a German brings this internal religiosity of the spirit of Aristotle into modern prominence out of a fragment (15 R) of a lost work of his. To find Aristotle drawing certainty of knowledge "from the moral law within me and the starry vault above me" identifies him at once with Plato and his distinction between knowledge and opinion, and we see at the same time this sentiment as the origin of the famous saying of Kant. In the works of Aristotle which are preserved to us we get only an adumbration of this transcendentalism; in the "*Laws*"²⁰ of Plato we get it not unlike the sentiment of Kant in the form of its very terms. But Aristotle as we know him speaks not at all in the mystical terms of a seer in this connection. It is the early Aristotle, not the late one in his systemic works, we find discussing these matters.

¹⁹ "Wer die Weihen empfängt soll nicht mit dem Verstand begreifen, sondern innerlich etwas erleben und so in einem bestimmten Zustand versetzt werden, vorausgesetzt dass er dieses Zustands überhaupt fähig ist."

²⁰ 966 d.

While I am not sure the "Timaeus"²¹ of Plato commits him explicitly to a belief in the prophecy of dreams, it was the soul, as in primitive belief, that was the mirror in which they are betrayed to consciousness. For the savage the soul leaves the body in dreaming sleep and makes observations not otherwise entering into the mind's cognition. Homer was a pneumatist who conceived the soul in the terms of the *pneuma* we breathe in the air and when a man loses consciousness he parts, temporarily it may be, with his soul. When Sarpedon faints from the pain of a spear wrenched from his thigh as he lies under the majestic branches of the mighty oak of Zeus, his father, his soul departs, but it is the cool breath of Boreas blowing on him restores him to life and we infer thus restores his soul to him.²² It is in primitive notions of this sort that the idea of dreams being prophetic, or at least a source of information, took its rise. Whether or not this was exactly Plato's conception, there does not seem to be much proof, from Jaeger's exposition, that Aristotle in his association with Plato was at the time committed to it or which Poseidonius believed committed him to something of the sort as Cicero²³ and Sextus Empiricus quote him in connection with this passage in the "Timaeus."

You can never tell how seriously Plato takes himself in some of his speculations and Cicero himself was one who apparently joined the augurs in their smiles at their own prophecies and took Plato in the sense that disturbances of the liver and of the body generally cause disturbances of the mind and stimulate it to dreams. Aristotle in his discourse on philosophy, as quoted by Jaeger, did not interpret Plato in this apparently veiled sense and perhaps we have no right to do so, but elsewhere from a source not accessible to me Aristotle²⁴ is quoted as

denying God sends prophetic dreams, which is certainly a contradiction to Plato's assertion that God has given us the art of divination to supplement the foolishness of men, when such intelligence as they have is banished in sleep, for it is thus the "Timaeus" runs. As I take it here this is a rapier thrust of Plato at the understanding of mortals, whatever else he meant. As Hicks in his introduction to the "de Anima" exposes the opinion of Aristotle in this connection, the whole subject of dreaming is absolutely devoid of any supernatural trend. If the citations from the youthful discourse on philosophy represent him correctly and he was really the author of it this represents quite an altered state of mind, quite an evolution of thought from that of his days of unquestioning Platonism. From the primitive thought of the soul leaving the body it seems a revolution of rationalism, a revolt from the metempsychosis trend of thought which lurks in this primitive notion. When he passes from this sort of thing to the theory of vapors arising from the stomach he has added to theory something very materialistic in the way of observation. We get track of it in his "History of Animals"²⁵ where not only men appear to him to dream but horses, oxen, sheep, goats and dogs, the latter evidencing it by barking in their sleep. I do not know that this shuts out the divine in dreaming, but it rather takes the exclusive anthropomorphic edge off the theory.

It is somewhat surprising to hear it at times asserted that before Plato and Aristotle the ancient Greeks deprecated human thought reaching out beyond human experience. There is where thought began, one might say. Between the nature philosophers and Aristotle, not counting Plato, there was a host of Greek sages letting their imaginations run riot as to things about which man never had any experience and never will. This notion must be inspired by the reluctance modern thought in certain exclusive circles exhibits, or has until

²¹ 71 E.

²² *Iliad*. v, 696.

²³ *De divinatione*. i, 62-64.

²⁴ *Parva Naturalia*: Prophecy during sleep. c. 1, 462 b. 20.

²⁵ *IV*, x, 1. (Creswell), Bohn's translations, p. 97.

recently exhibited, of taking full advantage of human experience to say nothing of reaching out beyond it. Pragmatism seems to have had its day and another day is dawning, but the positivism of Comte and Spencer and the pragmatism of James ruled the latter part of the last century and only began to show a decline in the early years of this. In the "Epinomis" Plato, or another author whoever it may have been, protests against the positivism of his day, but there is enough of it in the better authenticated dialogues coming from him. In Aristotle we are likely to overlook this transcendentalism. As a matter of fact the Greeks before Plato's birth seem to have given away to this after the reign of the Ionian nature philosophers, in the wake perhaps of an oriental revolt against them, but there had been, Jaeger thinks, an introduction into Athens of oriental astronomy. History hardly tells us of a time before Aristotle when oriental thought, whether materialistic or mystic, did not penetrate Greece from the East. Not Aristotle alone, but even Plato before him, were attracted by the former. In the "Timaeus" there is much of it. But after Plato's death and the publication of "Metaphysics" his associates in the Academy "recognized under the conservative cover the revolutionary spirit of a new world philosophy and no longer looked on Aristotle as a Platonist, but he himself at first did not realize or acknowledge it."

We touch on the utilitarianism of modern days and that with which in regard to education Plato and Aristotle quarreled about in their disputes with Isocrates in the first pages of the "Metaphysics." We desire the blessing of vision not alone that we may do something for our survival, but we desire it even when we have no thought of doing anything of the kind and vision is of all senses the most useful. In this thought alone is evidenced an aesthetic beyond the desire of sensual gratification and in such aesthetics we are privileged to find an excuse for venturing with our thoughts beyond mere mundane affairs. What we regard as religion

is really a composite of ethics and theogony. With much of this human experience has not a great deal to do, but with ethics it has everything to do, for that primarily means habits. As to religion, ethnologists have often made it appear to us that the departments of theogony and ethics are usually much more sharply differentiated among primitive men than among moderns. We perceive a theogony often, though not always, separated from tribal rules of conduct among individuals. As we read Homer and Hesiod and such scanty remains of other Greek folk literature as has come down to us, we perceive that before the time of the nature philosophers there was an active theogony, it is true, but what we regard as ethics had very little part in it. Xenophanes is the first reformer, of whom we have trace, insisting the gods must be moral even though immortal. In Plato we find a far more authentic rebuke to the ancient theogony. Although he is continually quoting Homer, Homer is to be banished for ethical reasons from the educational scheme of his "Republic."

When one speaks of the ethics of Aristotle one is usually referring to the "Nichomachean Ethics." This is a later work and is given the name of the son he had by Herpyllis, the concubine who succeeded to the bed of Pytheas, but who did not displace the love of the memory of her who had been his very dear wife. But he wrote an earlier work on ethics, the "Eudemic Ethics" named after Eudemus of Cyprus, the friend of his youth after whom the dialogue containing much the same material was also named and who met a violent death in 354 B.C. Starting with Socrates we find the same beginning for the Aristotelian ethics in the dialogues of Plato when we take up the "Nichomachean Ethics," but especially in the "Eudemic Ethics." In Plato virtue forms the highest aspirations of the tripartite soul, but in the "Nichomachean Ethics of Aristotle" it rapidly develops an ethics more alienated in many respects from the personal ethics of Socrates. The

virtue ideals Plato applied to man's inner perceptions of right and justice become in Aristotle the culture standards of wider application and the personal side of it more limited. It is thus that the Platonic ethics enter widely into general Greek consciousness, but in essence Aristotelian ethics remains, like his metaphysics, a Platonism. Before Plato the crisis came of the conflict between the inner personal ethics of Socrates and the prevailing tyranny of the Greek state ethics. The conscience of man must bow to the rules of the state, falsely dubbed as ethics, and the conflict is seen in the Socrates of the "Euthyphron" and for Socrates it is ended in the tragedy of the "Apologia" and the "Crito" and it has left him the everlasting martyr in the hearts of all mankind.

Aristotle stands forth first among his peers in philosophy, moral and metaphysical, in the kind of analysis he gives it, but in natural philosophy he stands forth with greater distinction, not as the first great nature philosopher, for there were others before him, but as the first man of modern science. It was in vain his immediate followers in the school he founded pointed out the way he was headed at his death. The Lyceum after Theophrastus, after Straton at least, became a babbling of peripatetic word twisters like Chrysippus, and the Academy was eclipsed by the Epicureans who taught an ethics, unobjectionable in itself, but quickly leading to a degenerate ethics or to no ethics at all. Philosophy and the budding science of Aristotle migrated to Alexandria and science as science branched off from the ancient philosophy derived from Plato and Platonism. The main stock of it became the wordy mysticism and transcendentalism of a Neoplatonism adapted by Christian theologians to a new faith and it has had a great career in the world.

It is evident the "Eudemos" was written by the author of the "Protreptikos," but that it was written in the same youthful period is not so clear, though perhaps at least not long after it. The sentiments are

of the same hue and the language much the same though perhaps somewhat more skilfully handled. It became as authoritative ethically for the Neoplatonists as the Socratic ethics of Plato. An ethical man he defines as one judged better by his works than by his principles, though the former may flow from the latter. Habit and temperament play their part as mainsprings of action, though emphasis does not seem to be laid on what we regard as the most etiological of all, the environment. One is compelled incidentally to see by this expose that the fundamentals of ethics were the same in the Greece of Aristotle as in our present civilization and it thereby appears, if we base ethics on environment, we must frankly acknowledge that the real basis is the general diffusion of knowledge. Something of this connotation, which in recent times we have much overemphasized, we find in Aristotle as he later developed his ethics. We insist the evolution of rational thinking at certain given levels of general enlightenment shapes the ethics at that stage by averages in every race. It was natural to those whose world was a narrow Mediterranean world to miss the importance of the factor of latitude and longitude in so far as they influence the varieties of culture, but Hippocrates knew this well. Plato and Aristotle, however, we find placing large emphasis on the close connection of virtue and knowledge, but virtue was more than ethics or habit. Aristotle voiced the stoical life philosophy of the Greeks before him. "Either be the slave of living or give over the thought of living well" is a favorite motto of his in the "Protreptikos." It is evidently from his earlier rather than from his later works the Stoics took their cue. In the "Nichomachean Ethics" we get perhaps no reversal of this apothegm or disparagement of it, but the tone is different. Life is likely to make us less hortative about virtue as we grow older in philosophy, unless we have acquired bad habits on the platform or in the pulpit, and so it seems to have been with Aristotle.

We find him in youth counselling us to live well by avoiding violence and by extirpating the diseases of the soul. In this true Socratic flair for moralizing, but also in the wording, we get a glimpse of the origin of his famous ideas developed in the "Poetics" and elsewhere as to the purgation of the soul by Tragedy. Platonists have traced this to the notation by the Master that music hath power to tame the savage beast and cure affections of the mind, but here we get another Platonic root for it in the "Protreptikos." There and in the "Eudemus" is the same reference to Anaxagoras and we may think perhaps harkening back to Xenophanes, that knowledge too was visualized as a purger of the soul. The expulsion of thoughts from the mind by catharsis is an idea of primitive man. Its recent Italian application in expelling socialistic views from the minds of Italian citizens will occur to the modern observer. Ross points out that Gorgias is credited with saying the effect of poetry on the soul is comparable to the purging of evil humors from the body, but Aristotle's form of the idea is that the sight of passion on the stage expels passion from the heart, a *similia similibus curantur* turn of thought. Plato does not appear to have held this view, but from the "Laws" we have already extracted Kant's well-known saying as to the moral law within us. It belongs to the same order of thought, but in the thought of the young Aristotle especially we get an intercalation with the Platonic dialogues of the later period and in the mature Aristotle some of this thought becomes the marked characteristics by which we, who have only read his later works, know him.

Howald²⁶ lays great stress on the catastrophe, not only to Plato's own personal pride but to his philosophical faith, which he received from his Sicilian adventures. It is probably not much more than legend, but it is said Aristotle was among those pupils who protested vigorously against his long absence from Athens and the

²⁶ Howald, von E. Platons Leben. Zurich, 1923.

Academy on these expeditions, probably the later one. His Sicilian experiences we may well believe wrought havoc in his political theories. Dion went wrong at Syracuse. The high ideals he had encouraged in him and taught the Athenian youth for their guidance in the governmental duties which were likely to occupy their maturity came to wreck in Sicily. In his old age he beheld the ruin his theories caused or were credited with causing when an attempt was made to put them in practice. Aristotle had come to him in 367, in 357 the experiment in Sicily was made. In 353 Dion, his favorite pupil, was murdered as the result. This must have been a memorable event for Aristotle. In the "Metaphysics" and in the "Nicomachean Ethics" we have puzzling passages which can only be explained on the theory that the books, which constitute the collection as we know them, must have been written at different times, but which books were written at which times scholars have been fighting about ever since Andronikos. Aristotle must, at the time of the Sicilian expedition of his master, have had an opportunity for criticism as well as for his alleged complaint. He had long been familiar with the enthusiasm of the Athenians for liberty, freedom, democracy; he had known oligarchies and tyrannies and kingships from personal experience and he wrote his "Politics" at a time of life when experience had ripened and matured his judgments.

Plato must have written his "Republic" long before his experience with the Sicilians. It belongs almost exclusively to an early period of life to dream of making good government for wicked men. Wicked men in power had put Socrates to death and Plato thought he could construct a government wicked men would have no part in. Aristotle had no such illusions when he wrote the "Politics." It much more than the other books is free from the Platonism of his youth. It is by means of the dialogues that Jaeger traces out the evolution of

Aristotle's thought from some of that we recognize in the "Republic" to that of his more practical "Politics." We may hold the demagoguery of Demosthenes responsible for the change, or rather we may credit Aristotle's practical experience with it and the

training he had from his father-in-law, Hermias, the Lord of Atarneus, admirable and lovable as Aristotle found him. We may hold the "Politics" for perhaps the best discourse on the science of government ever given to the world.

III. THE GROWTH FROM PLATONIC TO ARISTOTELIAN PHYSICS

It is very difficult to put Aristotle into compartments for study and discussion. It is nowhere more difficult than in that vague territory lying on the borderline of materiality and immateriality. His "Metaphysics" we find largely made up of discussions as to matter and its attributes. His "Physics" is chiefly concerned in tracing the roots of physics as he finds them in metaphysics and the stretch of the lateral branches of the tree of knowledge into biology and into physiology as part of it. Into these latter regions we shall not venture far here, because this is more specifically a series of articles on the evolution of the thought of Aristotle as it grew out of Platonism. His biology is a more restricted term for us here. It does not include physiology. Aristotle did not evolve biology, he began it and the evolution of his thought as to physiology I have developed elsewhere²⁷ under other headings. It is materialism then in the sense of modern physics as it is oriented in the field of the evolution of Aristotle's mind that will concern us here and yet we enter at once into metaphysics as its inescapable foreground. For us too physics or Nature is coterminous at the other extremity with life, but he discusses the basis, the start of it all as no biologist does with us. It makes up the major part of the "Physics." The "de Caelo" and the "Meteorologica" correspond more closely to our physics than his "Physics" does.

In the thoroughgoing analysis of many disciplines of scientific thought it has proved profitable to proceed from the particular to the general. We thus perceive the evidence of the existence of the law before we perceive the law itself. This has been made a tiresome

fetish. Stereotyping the way to gain knowledge is giving way to a blind herd instinct to evade the necessity of thought in one's everyday occupation. It has proved popular with those incapable of it. Sometimes it is a good way and sometimes it is a bad way, according to the job and according to the man who undertakes it. In cosmology every man who thinks at all is likely to perceive the necessity at least of exposing first the starting point of a system of thought and that starting point for Aristotle was the Mover of the Cosmos. For other cosmologists it is chaos, but one naturally wants to know who left things in such a state as much as he wants to know who moves the mover. Aristotle by induction, deduction and logic arrives at a categorical conclusion which he regards as imperative and that postulates an Unmoved Mover. There is nothing in this Aristotle needed to acquire from Plato or any one else, unless it is the phraseology. It is the conventional product of a natural sequence of thought in a mind trained to be logical, but it is a statement that is plain and unequivocal. Every philosopher makes the same start, but no one, not even Plato, comes out in the open with a postulate which bears so plainly on the face of it the sign of the impotency of the human mind. Plato like the ancient priest, and the modern one too for that matter, hides the Mover in clouds of mysticism. Plato puts him behind a curtain as the God of gods. I suppose this is instinctive, unconsciously a cherishing of a secret hope that the observer will believe the priest can, and he would, draw aside the curtain. Aristotle shows us a wall which the human mind well knows it cannot penetrate. There is genius in that.

²⁷ *M. J. & Rec.*, N. Y., 1926.

The Unmoved Mover is an impossibility, but it is no cloud or cloak or compromise. Plato needed the demiurgi to come out from behind the cloud and do the work to be done in the universe for priestly reasons. No one of this world or in this world does anything in it sheltered from criticism and questioning. We can understand why a veiled Supreme Being needs demiurgi, but why should the miracle of an Unmoved Mover, Himself out in the sunlight, need the intervention of souls and entelechies? For him as for Plato the whirling stars in the sky need the guidance of deputy gods or souls. Plato imagined each one an animal and the deputy or demiurgus guided it by the soul within it. We simplify all this by calling the demiurgus and the soul "Law," but after all it is but a name. However inevitably similar was the start of Plato's physics and Aristotle's, there was perhaps some choice of apparatus for it afterwards, some latitude given to the terms at least in which the apparatus was to be described. It is significant perhaps of his Platonism that Aristotle adopted much of the Platonism paraphernalia. In his animals he put an entelechy which answered for a soul and sometimes it was so called, for we often have difficulty in distinguishing the two. In each of the stars he left such a mover. In the stars their interdependence became apparent, but with the advent of Eudoxus in Athens the connection of their mover with the Unmoved Mover became vague, notwithstanding a glimpse is given of the single plan the Unmoved Mover had for them.

It was thus that the "Law" emerged, the "Necessity" which is already apparent in the "Timaios" of Plato. The functions of the demiurgi and the star souls became not only uncertain but insufficient. Plato's God was indeed a Form or Idea dominant over all and in this relation there seems to have been much discussion in the Academy over the cause of the movement of the stars. They could be bodies containing souls and the soul in Plato is a part of what later in Aristotle became the Unmoved Mover

Himself or perhaps the soul worked on the star from without and not from within, a fiery air-like thing which pushed the stars along, or the soul is entirely without body and works in some wonderful way unknown to us. This, according to Jaeger,²⁸ without whose help this analysis would be quite impossible for me, was the stage of the opinions which seem to have pervaded the mind of Aristotle when he was writing his early dialogues, but out of the diaphanous Platonic form of God grew the Unmoved Mover of Aristotle, which in this light appears actually as a decided step toward the reality of science. Ross,²⁹ to whom I also owe a heavy debt here, says the first mover is at the circumference of the world for Aristotle and the movement imparted must be the fastest of all because it dies afterwards as it is transmitted, but what the entelechies and the other souls could be doing while this loss of energy is taking place is one of the uncertainties only for us fresh from recent beliefs in its being always kept intact. There were metaphysical objections which then seemed more vital and which were inherent in the Platonism he carried with him to his latest years. How could the incorporeal have anything to do with the corporeal? How could it push the stars along? The struggle to visualize the pulling and pushing (what other energies could there be?) is the struggle toward materialism, which has resulted in much.

In the "Metaphysics,"³⁰ however, the Unmoved Mover seems not to be restricted by necessity even of circular motion since He energizes at will and one loses the deputy mover altogether. In this chapter (7) he does not appear at all since the Mover seems to be in and of all things but the motion is in a circle because that is the only kind which can keep on forever. We infer that the universe of Aristotle therefore was a

²⁸ Jaeger, W. *Aristoteles, Grundlegung einer Geschichte seiner Entwicklung*. Berlin, 1923.

²⁹ Ross, W. D. *Aristotle*. New York, 1924.

³⁰ Aristotle's *Metaphysics*. Ross, *Op. cit.*, 1072 a 19 seq.

limited one as we are beginning to regard it. One easily sees what he started with, thus, from what we know of Plato's later physics, but to know clearly the process going on in the maturing mind of Aristotle one would have to know more or less exactly the chronology of his works. There is so much of his basic thought concentrated and exposed in the "Metaphysics" that one in that case might trace it there alone perhaps, but it is precisely the "Metaphysics" which is so palpably contradictory and so evidently written different parts at different times. Yet in what order they were written has always been a bone of contention. Ross and Jaeger use up much of their space in arguing about this chronology, though they finally leave their readers very much at sea indeed about the Unmoved Mover.

The difficulties are not all metaphysical, as we have seen, but in our terminology science, if it is as religious as it is at present pretending to be, must regard God as the ultimate source of energy and of matter too since we are busy with changing one into the other. If for nothing else it is good to have some symbol for that, if we banish the clouds from around it. Aristotle furnished us long ago with a formula for what to our minds is impossible but a necessity, the Unmoved Mover. On the whole from a scientific point of view it is the best one still, but Aristotle is not always consistent. The Unmoved Mover energizes Himself and we get a line on the familiar thought of Aristotle as to spontaneous generation. He illustrates it from a standpoint with which we have nothing to do. "We create the beautiful and desire it. We desire it because it seems desirable, rather than it seems desirable because we desire it, for the beginning of all things is Intelligence." I suppose the meaning of this obscure passage, with the text of which there has been much tampering, is that Intelligence has created something out of itself, but I have no translation that helps me. At least this seems the general sense of the chapter, but in it he switches from a purely pantheistic concept to a purely meta-

physical one in a short paragraph. We can hardly ascribe this to a chronological disavowment, rather perhaps it is in the way of illustration with a coloring of spontaneous generation. There seems no mistaking the idea that the Unmoved Mover is the mystical agent in all this which manifests itself materialistically.

If the part dealing with motion is the consequence of his reaction to Eudoxos' last visit to Athens, we may conjecture that at this time he had not rejected Plato's theory of Ideas or Forms. In any event wherever his metaphysics meets his physics in the ancient order of thought that has to be considered. Matter as affected by motion might not be eternal in Plato's view, but the form was. What effect on Aristotle Kallippos later added to that of Eudoxos cannot be measured, but the "de Caelo" at least seems to have been a later outgrowth of the evolution of Aristotle's mind long after he had freed it from the Platonic prepossessions as to form and indeed from some things in the "Physics," though some of the latter could not at best have much antedated the contact with Kallippos and this still betrayed the influence of Platonic thought. However this may be, when he came at probably a late date in the "Physics" and probably as a result of his biological interests, resulting from opportunities for their study after Plato's death, to the realization that local movements of animals are due to the motions set up in their bodies by food and that the consequent processes of sensation and desire are thus set up in their souls, he had in reality advanced far from the original doctrine even though he provided an entelechy to guide aright the digestion and assimilation of the food. Something of this is nevertheless found foreshadowed in the "Timaios" of Plato. The primitive trace is seen in this close link of the animate with the inanimate and the introduction of matter as causation seems inescapable, but it is carried beyond primitive thought in the realization that it needs something, at this stage of change to the living, to guide it aright,

while in the stars it is less apparent, though in fact the argument is no less insistent. "For Nature we say is the principle of movement."³¹ We need not follow the refinements to which Aristotle's argument advances to explain this, which seems a direct contradiction to his arguments elsewhere, especially to his criticism of the contact of matter and soul in Plato's conception of it in the "Timaios."

"Nature is innate impulse to motion," in the interpretation of Ross. According to the "Physics" there has always been and there always will be motion. Nature we are now ready to conclude is motion. For Aristotle it was actuality. It is the manifestation of God. There could be no more laconic or accurate mirror of modern sentiment than such short summaries of the doctrine of Aristotle, but it hardly is inclusive of the Unmoved Mover. The Actuality and the Capacity do not altogether harmonize with the latter conception. He departs too a little from the modern physical theory in the belief there are things which are sometimes at rest. Our electronal physics have banished this conception and the theory of relativity has furnished us with a compromise or the possibility of one between the ancient and the modern physics, but in neither can we escape the inexorable logic which demands that when something is moved there must be something which moved it. In this backward penetration toward the origin of things Aristotle or anybody else finally has to accept the impossible proposition we started out to disown. We soon reach the impossible in the Unmoved Mover. It is petty defiance to exclaim with the old ecclesiastic: "credo, quia impossibile est," but if one is going to call his psychological state of mind on the subject belief, there is the proposition, there is the article of the creed he has to swallow, plain and unadorned. Whether he does so or not is largely a matter of temperament, largely a matter of environment, like most psychological states of the insect man. After a fashion we are willing to admit,

³¹ De Caelo, 268 b 16.

this once settled in the affirmative, that circular motion may go on forever. Our modern limited curved universe offers no obstacle, the Unmoved Mover may or may not be necessary afterwards, but there must be a beginning. But why should we demand a beginning if we can conceive of motion without ending?

Now we get the germ of all this in Plato's later works, especially the "Timaios," but in Aristotle's later work, as this seems to be, we get temporarily at least a firmer grasp of the situation, the solution of which we nevertheless see escapes us in the ultimate analysis when we skirt the mysticism of the Infinite and the Eternal. We meet intellectually the same dilemma when matter, in the modern demands of our science, melts and evaporates into energy and leaves us nothing to energize in the modern monism. Aristotle carried us to the limits of thought thousands of years ago. It was the contemplation of the heavenly bodies which helped or rather pushed Aristotle along this road just as a celestial physics has pushed us, but Aristotle met with entanglements, which Jaeger seems to think embittered his last days with disappointments. Plato, he and Howald³² suppose, as the result of the wreck of his political ideas in Sicily, died long after of a broken heart, aged eighty-four. Aristotle, he supposes, was precipitated into a long and painful illness (perhaps we may think of cancer of the stomach), which ended his life, by pondering over the inexplicable chaos he got into with his statements as to celestial physics. This, in true German fashion, is taking things *au serieux* with a vengeance, and it must be confessed it is difficult for the jeering foreign reader of such biographical blether, with the scantiest of information of their heroes of twenty-five hundred years ago, to keep the sober face decorum demands in the presence of such a sterling and admirable author as Jaeger.

However, when one reads the "De Caelo" of Aristotle one finds some excuse for the biographer's solemn conclusion that it must

³² Howald, von E. Platons Leben. Zurich, 1923.

have driven Aristotle to despair, if not in the compilation, at least when it was wrecked by the ultimate demonstrations of Kallippos. He was the pupil of Eudoxos. The latter when he first came to Athens is said to have been driven out, by fundamentalists I suppose, with contumely. But when he returned later and was made much of by the fickle Athenians Plato was still alive and he and Aristotle still stood in the relationship of master and pupil, and both were inspired, especially Aristotle, with the new astronomical ideas from the Orient. It is thought the further development of them by Kallippos, who came to Athens perhaps in Aristotle's last days there and reformed the Athenian calendar after his death, drew Aristotle on to his intellectual débâcle in sky physics. Perhaps it overset the work Aristotle had evolved from the teachings of Eudoxos long before, though Kallippos was a pupil of Eudoxos too. Kallippos invented spheres within spheres with poles at differing points, so that a compound motion was provided for, whereby the phenomena of the sun, moon and planets were supposed to be explained. Outside of all, I take it, was an encompassing sphere and the stars fixed in it whirling around in twenty-four hours, but Aristotle in the "*de Caelo*" has been reckoned to have provided as high as fifty-nine spheres which introduced ungraspable complexity for us and may well have thrown the aging author into confusion of mind himself. The sphere disappeared with the advance of astronomy after Aristotle. They became unnecessary, but there is much in the "*De Caelo*" which is the germ of that which made them so. He preceded Archimedes in the realization that the weight of a body depended on the density of the element in which one weighed it, one weight in water and another weight in air.³³ Fire and probably the ether had no weight at all for him. As he skirted the confines of specific gravity so also did he those of gravitation.³⁴

³³ *De Caelo*. iv, 4, 311 b 1-10.

³⁴ *Ibid.*, 307 b.

Much in it we recognize as new and much which was evidently a late stage in his mental growth, for essentially the Unmoved Mover was born early. It is to be found in the dialogue "*On Philosophy*" made out of the Supreme God of the "*Timaios*" and the circular motion he has from the same provenance and with it, encountering the problem of the stars, he ended in despair, according to Jaeger. But the Unmoved Mover did not receive this development or modification until later in the "*Metaphysics*," where it forsook its transcendentalism somewhat, though it gave birth to a kind of demiurgus familiar to Platonic philosophy, which in the animal body Aristotle used as an entelechy, but in the stars it remained a soul in accord with Plato, though the latter both in the "*Timaios*" and in the "*Laws*" conceived the star soul as a diffused sort of extension from the Supreme Being. In Aristotle this is not so evident, though in partaking more of the character of what we understand as law it symbolized the same underlying thought. Thus far there seems nothing essentially new, but though the conception of an ether did not begin with the young Aristotle as Jaeger, in perhaps an incautious passage, seems to intimate, he did much to give the definition of it precision and he put it among the elements in reproving Anaxagoras.³⁵ In the "*Meteorologica*"³⁶ as the Oxford translation reads, Aristotle says:

The question is really about that which lies between the earth and the nearest stars. . . . It appears to be an old assumption and one which men have held in the past, for the word ether has long been used to denote that element. Anaxagoras it is true seems to think that the word means the same as fire. For he thought that the upper regions were full of fire and that men referred to these regions, when they spoke of ether.

It does not always appear how distinct they existed in the thought even of Aristotle, but after some remarks on the belief of

³⁵ *De Caelo*. 270 b 24-302 b 4.

³⁶ 339 b 14.

those that went before him it seemed clear to him "that neither air nor fire alone fills the intermediate space." Here the evidence for a fifth element seems conclusive to him, but we are rather induced to believe that this conclusion was one reached not by the young Aristotle, as Jaeger seems to think, but by the old Aristotle after he had studied the problems of the astronomers. There is a curious connotation which had rather far-reaching connections with far later theology as well as science. Whether confounding ether with fire or adding it to the other elements he did not consider it improbable that salamanders can live in fire³⁷ and insects fly through it unharmed. Though he accepted the testimony of others for it he lacked that of his own observation. Fish live in the water, birds in the air and land animals have their own habitation and salamanders, perhaps other life, may exist in the fire. Why should not the ether, the most labile of all, furnish a medium for the souls of the stars? If there is an ether, which has its share of modern disbelief, matter gathering together from the dissipated energy has its birth there, we surmise. It is curious, with this citation of modernity, to see the thought which stirred the minds of men in Aristotle's day and long before it to demand an ether in which things take place as a necessity of the mind. Nature is said to abhor a vacuum, but the human mind is paralyzed by a void. If the stars have souls what sort of a medium do they work in? If fire is an element, what lives in it? Now it is not my purpose to irritate men of modern science by reducing the profundity of their thought to such shallow depths, but I wish to invite a spirit of charity, of condescension if nothing better can be obtained, that they may compare the exalted workings of their own minds with those of antiquity. Some foolish people have from time to time been so bold as to say the ancient mind had powers far beyond those of the modern mind of man, but in science we know that it is not so.

³⁷ History of Animals. v, 12.

We have long instanced this very example of the belief in fire as the natural element of the salamander. Any body that would believe that or that the hen pheasant is fertilized by the pneuma born on the winds that sweep the prairie will believe anything. Yet there is now a demand for that kind of man in science.

We see in the ether very likely the background of the belief of Plato that the world is an animal and the stars too and they have need of souls. So salamanders live in fire. Marco Polo found that belief in Asia, but like Aristotle he heard of it from people who said it could be observed elsewhere on that continent. Philo and Apuleius gratuitously surmise, notwithstanding the inference in the "History of Animals" as we have it, that Aristotle must have seen the phenomena in Macedonia, but as we have it he had heard of it from the copper smelting furnaces, where no doubt scoriae are seen mingled with the flames, but "they say fire is extinguished when the animal walks over it." We think of Sir Oliver Lodge listening to the mediums. Now this is the difference between Aristotle and Galen. Aristotle is credulous at times no doubt, but Aristotle does not lie about salamanders, as Galen lies³⁸ about scorpions. Though in two or three passages Galen speaks only generally of the sputum of fasting men killing them, in one of them, in his ardor to prove it is not the incantation which kills, spoken as the man spits, he declares he has himself seen a man kill a scorpion with his spit alone, not using an incantation. Now there may still be those casuists who believe a lie justifiable in a good cause, but Aristotle and Lodge are not of that kind.

Jaeger finds cause to trace some of these statements back to Aristotle's dialogue "On Philosophy," but as to his belief in demons, we must remember Socrates listening to his demon as Plato paints him in the "Symposium." We must think of Thales who believed the air peopled by them, mani-

³⁸ Claudii Galeni Opera Omnia. Ed. Kühn, xii, 289; vi, 754; vii, 745.

festly, from what we know from archeological sources and elsewhere, a derivative of Babylonian belief. Plato makes no claim to having *seen* Socrates' demon nor, I think, does Aristotle say he had *seen* demons, nor Lodge that he had *seen* spirits. We are at their feet as our prophets and we take them to our hearts as erring fellowmen and brothers, but when Galen says he *saw* a man kill a scorpion with spit, we stone him. We adore those who teach us to leave all and follow the truth, but it is not worth while to lie about it. The air was the element in which demons dwell as do the birds, but the souls of the stars dwelling in the ether, as set forth in the works of Plato and Aristotle, furnished the patterns for the medieval angels. It seems hardly worth while trying to trace all this kind of thought in Aristotle back to his juvenile days as Jaeger does. It dwelt in the air he breathed all his life and before it and after it. He did not invent any of it. It was not a part of the evolution of his mind though he used the common beliefs as illustrations, if not as proofs for the various stages of something more fundamental. In Aristotle's days theories as to the nature of the stars were as thick as blackberries. If he utilized common superstitions to support them, who can blame him?

"Fire, air, water, earth originate from one another" is an explicit assertion³⁹ of Aristotle, "and each of them exists potentially in each, as all things do that can be resolved into a common and ultimate substrate." This being more or less true for us, though the number of the elements is larger, we on the other hand can find small excuse for the severity with which he scores Anaxagoras for saying that fire and ether are the same things. The only explanation he could find for it would be in the hair-splitting dialectics which juggled with words in his day, but the origin of the ether finds its roots as far back as Homer. The word is repeatedly used by him, however vague its meaning, and by Hesiod and Pindar and the tragic

poets, according to the dictionary, often as an equivalent for air, but not always, as it circles up and around the abode of the gods. We find Plato in the "Timaios"⁴⁰ dealing with fire almost in the terms of the modern ether. The conception of earth as a solid element was such that when consolidated, fire only could enter it. Air could enter water when fire is applied, but it is fire only that enters the smallest interstices and penetrates even to the triangles, which we may look upon as the elementary atoms of matter in the conception of Plato. At most what Aristotle may have done was to separate this pervading and penetrating power of fire and make an independent element of it. There is none of Aristotle's writings on science which can be so plainly traced from the work of his master and from that of those who preceded him. In this instance, and I was going to say in this instance only, we are able in science to see from antiquity the slow progress of thought through the ages, its utilization by Plato and Aristotle, in whose books the ether is anchored for all time. I am not prepared to say how much the invention of the ancient ether had to do with the modern conception, but I should have to be shown strong proof to the contrary to be convinced that, in some imperfect form perhaps, it has not lingered in the thoughts of men as a need of the human mind contemplating cosmic problems, since the dawn of history.

We now seem on the point of discarding it in the interest of the doctrines of Einstein, but whether it was from the first a false conception or a conception representing essentially reality, through all these ages of the evolution of thought it has been a support and a guide. Whether we must dispense with it now or not remains still to be seen. It serves still in our minds in the turns and twistings of our thoughts as it did in that of Aristotle, but that the young Aristotle invented it can scarcely be maintained. Some trace of it even, I believe, has been found in Babylonian conceptions.

³⁹ Meteorologica. 338 a 36.

⁴⁰ 61.

It would be much nearer the truth to say that Aristotle invented the science of descriptive biology. He seems, so far as our knowledge of antiquity goes, to have been the first, and almost the only one for two thousand years following, who with incredible patience steadily pursued almost purely objective research. In all the other paths of thought Aristotle quotes so much from his predecessors that he is, more frequently than any other, unless it is Galen, the sole source of our information in regard to them. In his "History of Animals" there is almost nothing directly concerned with the subject which he quotes from others.

It seems incredible that a man could work like that without sympathy of contemporary support and the past research of others to guide him, but he steadily and with astounding industry, apparently without it, pursued the knowledge and recorded the objective observation of mammals and the lower forms of life, the latter especially.

One can hardly look on this as the evolution of his thought and, as I have said, I do not intend to pursue it here. It was the imagination and the creation of a new and fruitful field of human activity. His turn from mysticisms and metaphysics and even from physics to biology was a revolution and not an evolution.



[From Erastus: *Varia Opusculum Medica*. Frankfurt, a. M., 1590.]

DEFENSE REACTIONS DURING THE BLACK DEATH, 1348-1349*

By STEPHEN D'IRSAY, M.D.

NEW HAVEN, CONN.

MANKIND, when struck by the greatest (most widespread and most devastating) of all epidemics, did not surrender without a struggle. It is well worth the while to examine briefly the main features of this struggle, in its diverse manifestations. The various views held by the population in general concerning the origin and nature of epidemic diseases came to a thorough test as did the scientific tenets of the small group of trained physicians. It is very interesting to watch the development of sanitation, the permeation of administrators, political and ecclesiastic, with the protecting task. Physical defense takes a sharp turn during this epidemic of plague, particularly if compared with concepts of such defense prevailing at earlier periods, in taking ever more definite forms and adopting definite aims, based on the thorough recognition of the nature of the disease. But physical defense was only one manifestation of the reaction against the disease. Human nature has two aspects, one physical, the other spiritual (a parallelism which was much emphasized, of course, in the Middle Ages) and accordingly there appeared a group of defense reactions of a spiritual order. A study of these is equally profitable. Lastly, besides protective and relief measures of a rational and beneficial nature, we observe movements distorted and harmful, but equally actuated by a desire of defense, a desire of protection of the self and of the community. Thus, these movements, too, require brief mention, being contained within the scope of this paper: surveying the means and organization of defense against the epidemic of 1348-1349.¹

* Based on a lecture, delivered on the Jacob H. Schiff Foundation at Cornell University, Ithaca, N. Y., April 22, 1926.

How and where the plague originated and through what routes it spread cannot be discussed here. It is enough to mention that the views of the contemporaries have since been confirmed and well substantiated as to their correctness. Thus, it was common knowledge that the epidemic took its origin in China.² According to De'Mussi: "In the Orient, at Cathay, where the world's head is and the beginning of earth, dreadful signs and portents have appeared."³ These "portents" were reduced to common-sense terms by Ibn Batûta,⁴ the traveller who had spent the years immediately preceding the plague, 1345 and 1346, in certain sections of China. His findings, related by Ibn-el-Khatib, of whom presently, may be summarized in the following remarks: prolonged wars, resulting in the exposure of great masses of corpses, together with forest fires which lay bare great areas to the winds, carrying the "pestilential contagion" and causing famines, and famines *per se* may be regarded as the causes of the epidemic. The trade routes, carrying the disease with shiploads, caravans and so forth have been accounted for; the introduction of the infection into the Crimea and its westward progress have been equally correctly told. It is sufficient to say that, for the mode of spreading, both person to person and air contagion have been made responsible by contemporaries who traced the development of the epidemic (Nikephoros Gregoras and Johannes Cantacuzenos⁵ in Constantinople, and De'Mussi in Messina, Piacenza and Genoa, and so on).

Let us consider first the means of physical defense inaugurated by the authorities. Church councils, municipal governments, secular rulers and other authorities made scattered, abortive attempts at various times throughout the Middle Ages to check the spread of infectious diseases. Such

attempts were the sanitary regulations of the city of Arles in 1142, the famous Edictus Rothari, the ordinances of the Council of Lyon. Most of these, however, were directed against leprosy and some other more or less chronic infectious diseases. During the thirteenth century there were distinguished twelve *morbi contagiosi* according to several authorities, and these were probably the following: leprosy, influenza, trachoma, ophthalmic gonorrhea, scabies, impetigo, typhoid fever, anthrax, diphtheria, erysipelas, pulmonary tuberculosis and plague. Plague, then, was a well-recognized contagious disease and accordingly official measures were instituted against its spreading as soon as the authorities, lay and medical, recovered from the first shock of such a violent disaster. The first instance possibly of defensive action occurs in Catania. (Sicily, of course, was the first European land to encounter the epidemic and Messina, Catania's neighbor, was the first Sicilian city to suffer.) Patriarch Gerard Otho of Catania forbids under penalty of excommunication the burial of Messinese refugees within his city and later prohibits every intercourse with the refugees and their reception at Catania.⁶ These measures were not carried out effectively, as was to be expected, and the plague soon enough seized Catania, killing the Archbishop himself, a failure which can be matched by the example of Gloucester—here, too, attempts were made to cut off intercourse with Bristol where the plague then was raging, attempts which proved useless.⁷ It is to be noted that in these instances the primary mover was public opinion and these measures were enacted under its pressure: public demand was more or less confusedly followed by those in charge. In cities of Northern Italy, however, more effective methods were pursued and better regulations instituted by the authorities, spontaneously—they had a half year's experience with the plague behind them.

Thus, in Milan after the appearance of

the first cases three houses, the foci in question, were locked up, walled in with all their inhabitants, isolated and closely guarded.⁸ Those in the houses were thus mercilessly doomed, but further outbreaks prevented for a few weeks. True enough, soon the epidemic was brought into the city and the holocaust was futile, nevertheless, the principle was sound and the problem reasonably attacked. In Venice elaborate precautions were also taken.⁹ Doge Andrea Dandolo, the historian, and the Great Council appointed a committee of three,¹⁰ in order to, as they said "evitare la corruzione della città."¹¹ These three nobles, Niccolò Venier, Marco Quirini and Niccolò Belegno (elected late in March, 1348) could do but little to prevent communications with Venice, as various crafts kept constantly creeping in through the devious waterways connecting the lagoon with the Adriatic, but they at least attempted to do so and issued further orders to prevent transmission of the contagion. These orders were greatly concerned with the disposal of the dead; they comprised the following items: (1) designation of certain remote and inaccessible burial places, (2) appointment of special barges (*piatte*) for the removal of the bodies, (3) ordering the digging of graves not less than five feet deep. Further, (4) beggars were prohibited to expose dead bodies on the streets (as was their wont), (5) three experts were brought into the city, (6) various other relief measures taken (prisoners for debt were released, probably to supplement the greatly decreased labor and (7) entering ships were threatened with burning.¹²

Sanudo, the chronicler, gives the following account of some of these activities of the Consiglio del Pregadi:

And it was necessary to send corpses to be buried at S. Giorgio d'Alega [Saint George of the Sea-Weed], S. Marco Boccalame, S. Lionardo di Fossaruola and Sant' Erasmo and such was the number of the dead that they were buried on top of one another in the cemeteries

and scarcely covered. And thus the cemeteries became filled. And many died without doing penance and without being visited [seen]. And all remained in hiding for fear of one of the other. And it was provided to send about barges (*piatte*) [with men] shouting "Corpi morti!" and whoever had such dead in his house had to throw them down into the barges under heavy penalty.¹³

These churchyards mentioned by Sanudo were all distant; S. Erasmo was at the Lido, S. Marco Boccalame on an island which disappeared in the course of the long swampy life of the lagoon and there is nothing left to evoke these terrible memories.¹⁴

Physicians took active part in the defense; some heroic examples of expatriated Venetians I shall mention presently. Their number was very scarce; there were, for example, in the early fourteenth century only twelve physicians and twelve surgeons in State services. These numbers were probably increased; certain it is that surgeons were suddenly licensed to practice medicine during the epidemic.¹⁵ The cities of the Terra Ferma also followed the example of Venice: thus Treviso appointed a committee of sanitation, consisting of three doctors of medicine.¹⁶

Similar moves are encountered in a number of cities in France, Flanders, Bohemia and England. Good accounts are extant concerning the city of Tournay, in Belgium.¹⁷ There the main ordinances issued by the city council comprised these points: (1) the digging of graves at least six feet deep, (2) the removal of corpses into the outskirts and not into churches and churchyards as was usual; to which a few weeks later an order prohibiting an assemblage of more than two people at funerals was added. There were other, curious regulations, too, taking into consideration the detrimental psychic and moral effect of the disease. Work on Saturday afternoons and Sundays was barred and all swearing and cursing prohibited to avoid divine wrath. Rigorous orders against concubinage (very widespread)

followed; similar acts were forthcoming in Speyer. In other orders again we find mirrored the psychic terror induced by the tremendous mortality. The wearing of black cloth is forbidden and so is the tolling of bells. People must have been sitting up sleeplessly in their beds listening to the incessant ringing of death-bells, which solemnity, in parentheses, some writers charge to the avarice of the clergy, who received fees from the respective families for this service. Soon, however, every solemnity vanished; Mors Imperator ruled in solitary grandeur, accepting no such flimsy human tribute.

The depth of graves was one of the main concerns of the authorities, it seems, clearly recognizing thereby the contagion inherent in the diseased body as such, even in death. "There were generally made great, broad and deep pits in which the bodies of the dead were buried," reports the Chronicle of Prague.¹⁸ Such plague-pits were found in many cities, for example in Cambridge¹⁹ and in Avignon. In Avignon particularly much attention was paid to quick and appropriate burial. "During this stormy period, Pope Clement vi in Avignon," I quote from the First Life of Clement vi, "did things of great charity and consecrated a fitting cemetery in which to bury all the dead."²⁰ The Pope, in order to hasten the burials "and thus to prevent the infection of the air" gave a certain sum of money to anyone who would carry the corpses, for "there were hardly enough left to bury the dead."²¹ All chroniclers agree in emphasizing the important relief activities of the Pope during this test. He called out physicians to visit and attend the sick, among them his physician-in-ordinary, Guy de Chauliac, provided the necessary money for their care and burial and helped their families,²² besides showing many examples and acts of spiritual comfort, some of which I shall mention later. His scientific interest is betokened by the fact that he ordered autopsies to be performed in order to ascertain the cause of death,²³ thus

officially supplementing the scattered efforts in this direction discernible in many sections of Europe. His several prudent measures were unfortunately counteracted by an all too early announcement and celebration of the Holy Year in Rome (1350), which caused a new, although slight outbreak of the epidemic among the pilgrims assembled there.²⁴ But then, the joy was too great and its expression only too human.

What was the attitude of physicians toward the plague, particularly what means of defense, prevention and treatment did they recommend? I will cite four documents which are, each in its way, very typical. The first is the testimony of Ibn-el-Khatib, the Spanish-Arab physician.²⁵ This man coolly discusses the origin and etiology of the plague which, based on Ibn Batûta, he derives from China. The contagiousness of the disease is emphatically maintained. In favor of his view, the following "proofs," or rather methods of obtaining proofs, are adduced: investigation, experience of senses, post-mortem examinations and authoritative witnesses. Of the latter, he cites the example of one Ibn Abu Madyan. This man, in Salé, remained in perfect health, for he isolated himself by walling in the openings of his house (an old prototype of Poe's "Masque of Red Death"), escaping with all his dependents while every body around him died.

The prime causes of the epidemic are cosmic: stellar and planetary influences paired with a local corruption of the air, which latter is originally due to the prolonged exposure of corpses, free to the winds. The pathology of the disease is this: a certain "fever-poison" penetrates into the arteries and corrupts the humors; it might be thrown out again by way of certain secretions (e.g. hemoptysis!), provided the resistance (or "nature") is strong and is aided by beneficial astrological influences. Otherwise the poison reaches the noble parts, to wit: brain, heart and liver, and seeks to destroy them. Further resistance (in these organs) presses the

"poison" toward corresponding parts. By these are meant the lymph gland groups; the retroauricular ones corresponding to the brain, the axillary ones to the heart and the inguinal ones to the liver, and the poison may be dissolved by the normal heat of these structures; as we see, a crude and primitive, yet dawning concept of locally draining lymph areas and the protective function of the lymph glands. Concisely, he puts his pathological views thus:

Sometimes there is in nature only a particle of resistance and these matters are thrown into the above mentioned three parts [brain, heart, liver] and others, after they nearly took hold of the lungs and already some of the symptoms manifested themselves; but then there is a reaction, the "matters" return to their centers—after the lung exhausted its power—there is an exacerbation in the power of the poison, it dominates, overcomes the spirit of life and extinguishes it.

Thus are the main symptoms: fever, bubos, hemoptysis, explained (the bubonic and pneumonic forms probably occurred side by side), each in its significance. There are many other factors determining resistance: strenuous life diminishes it, whereas living in "pestilential localities" increases it (a primitive expression of some "Durchseuchungs-immunität"), but the main feature remains the contagion through person and air. "Contagion is denied only by two kinds of people: by hypocrites who speak with their tongue what their heart does not believe and ignoramuses who never have experienced a plague." Now, his preventive and therapeutic advice flows directly from the above concepts: Avoidance of infected places, localities, lodgings, clothes, tools and such things is of primary importance; the testing of the direction of wind is further counselled in order to place people out of the road of winds blowing from infected sections. Therapy is antiphlogistic; purgation, sweating are necessary to aid the excretion of the poison. The buboes are to be treated surgically.

The second authority I am citing is Guy

de Chauillac,²⁶ the surgeon who stayed in Avignon and discharged his medical duties though frankly admitting the reason: "and I, in order to avoid infamy, did not dare to absent myself, but remained there, in continual fear trying to save myself from infection by means of the remedies mentioned."

As we know he, too, became infected, though fortunately not fatally. The physicians were in a most difficult position, according to him, they had to attend the patients, an obviously futile task, fraught with the greatest danger.²⁷ He thus strongly believes in contagion: "And so great was the contagion (especially in cases associated with hemoptysis) that one caught it from the other not only by being with him but by simply looking at him." And then gloomily adds: "Charity was dead and hope abashed."²⁸ There were some marvelous examples showing that charity was not quite dead in the world, but of these anon.

Guy recommends for prevention venesections, cleansing the air by great fires (a procedure quite universally practiced and availed of by Pope Clement himself), purgatives, the enjoyment of fruit and good odors (a psychotherapeutic effect, to counterbalance the imagined "bad and poisonous air" conveying the contagion) and, most important, to leave the infected region as soon as possible. An obvious and egoistic piece of advice which was of no avail; the fugitives usually carried the disease with them. Therapeutic measures were purgatives again, various electuaries and cordials, some exceedingly complex, opening and cautery of the buboes: hailed by many as an important advance,²⁹ and (as usual) venesections. Venesections were a most terrible procedure; the struggling patients were bled to unconsciousness and further handicapped in the battle for their lives. Voices lacked not opposing this senseless practice, such as that of Galeazzo di Santa Sofia and others.³⁰ Nevertheless the procedure remained in universal vogue.

Next I cite Simon de Couvain, of Mont-

pellier.³¹ His description is very vivid but need not concern us here. He too, without doubt, accepts contagiousness of the person, of furniture, clothes and so forth: "The breath of the sick man alone may corrupt the healthy who will suffer from the same plague."³² The importance of resistance is equally emphasized; but in treatment and prophylaxis this author is an utter sceptic. "To hide is of no avail, flight only protects, but flight where?"³³ Ultimately he relies, with complete desperation, on prayer and faith.

I wish to illustrate prophylactic and therapeutic ideas with a fourth document, which is the "Consilium" of the Faculty of Medicine of Paris. This document has been described elsewhere³⁴; it contains all the characteristic features encountered in the writings previously set forth: the same notions of pathology and contagion, and some empirically founded therapeutic advice. Contagiousness here, as in other contemporary medical writings, is the central pillar of the structure.

A great many medical writings were forthcoming, *Pestschriften*, of which however it is difficult to determine whether they represent the reaction against this particular plague or those several years and even decades later. Nevertheless, some are contemporary and have to be noted. Gentile da Foligno, who showed fine examples of medical heroism and who died in Perugia in pursuit of his professional duties, advocates great bonfires for prevention, besides giving elaborate prescriptions for treatment.³⁵ Marsilio Ficino advises a very moderate and abstinent life and methods promoting cheerfulness and optimism, such as surrounding one's self with beautiful objects, flowers, jewelry and so forth and remaining as much as possible in gardens.³⁶ The number of remedies counselled is legion: laurel-leaves, vermouth, oakleaves and rosmarin; amber, mastix, laudanum, myrrh, sulphur, lavender, camphor, vinegar, volatile oils—all appear to protect man, together with such strange remedies

as: *Sal Urinae*³⁷ or even, *horribile dictu*, pus from the buboes, to be taken per os,³⁸ although the contagiousness of that pus was very well recognized!

Advice and counsel in regard to treatment was very often, and by the foremost medical minds, based on concepts of etiology and pathology, as has been illustrated particularly in the case of Ibn-al-Khatib. These concepts were of course preformed and preestablished, as is characteristic of contemporary internal medicine ("scholastic medicine"), but attempts have constantly been made to supplement these notions by new ones derived from observations in vivo and post-mortem examinations. Such instances in Avignon have been mentioned and such also have occurred in Perugia.³⁹

The medical profession worked in every way to contribute toward relief. Certainly we hear of many who fled, hid away, in various fashions tried to avoid that deadly duty which, as Guy de Chauliac so aptly put it, was totally futile. Nevertheless, there is no lack in examples of medical heroism. Marco Leon, a Venetian physician of Perugia offers his services to his native city and returns there (in December, 1349) "since it has pleased God by the terrible mortality to leave our native place so destitute of upright and capable physicians that it may be said not one has been left."⁴⁰ We also hear of one Francesco of Rome who was health officer in Venice for seventeen years before he left that city. This man receives an annuity of 25 gold ducats, for " . . . at the time of the terrible and great mortality, when nearly all physicians withdrew from Venice on account of fear and terror," he stayed on, saying: "I would rather die here than live elsewhere."⁴¹

The laity well comprehended the idea of contagiousness of this disease. This is betokened in the famous "Buch der Natur" of Kunrad von Megenberg; according to him, the general mortality is due to poisoned air. He gives expression to the conviction that men are safer on high mountains than

in the valleys on account of the light and volatile air surrounding the former.⁴² This conviction caused in many districts an exodus into the mountains and it is claimed that in Ireland mountainous regions remained comparatively free from the disease.⁴³ Other strange methods of protection against the "pestilential," infected air are heard of. Fumes of gunpowder and nitrates,⁴⁴ to be inhaled, are most protective in the opinion of John Colle, and a yet more curious piece of advice is forthcoming from him: "Attendants who take care of latrines and those who serve in hospitals and heavily malodorous places [this throws some light on certain conditions in hospitals] are nearly all to be considered immune to the plague: for poison weakens, overcomes and expels poison."⁴⁵ This opinion was widely held and protection was actually sought by spending hours daily in inhaling the vapors of latrines. It may be asked how much this idea contributed to the spreading of this and other diseases.⁴⁶

Let us now turn from the measures of actual physical defense to those of a spiritual protection and relief. As already pointed out, contemporary writers agree that the plague had a most detrimental effect upon altruism, upon the feeling of human solidarity. On every face there was written the impending and unknown doom,⁴⁷ "the pallid signs of approaching death," in the words of Couvain; and under this dreadful Damoclean sword each one's thought centered around himself, how to save himself. But then, again, there were glorious examples of self-sacrifice, as we have seen in the examples of individual physicians; and such were given by the nursing orders, ecclesiastic and lay. According to William of Nangis: "The devout sisters of the Hôtel Dieu worked piously and humbly, not fearing death"⁴⁸; and the various *béguines* and *Kalanden* (*Elends-Gilden*) did equally splendid work, in particular the Caland of St. Clement in the Hospital of the Holy Ghost in Lübeck.⁴⁹ Outside of individual acts of self-sacrifice, which were

concern
of the
in a ve
ating s
The in
not be
attitud
was a
belief
ental
lence,
power
contin
ing o
extra
ceive
To a
scatt
I ha
of to
and
than
spir
For
men
with
wou
ecc
pov
Cle
we
ab
ac
we
no
re
al
th
si
h
b
c
M
V
c
t
M

concerned mainly with the physical welfare of the stricken, however, are acts intended in a very direct way to render relief, alleviating suffering in a purely spiritual fashion. The importance of these measures should not be underestimated. The psychological attitude of the masses toward the plague was a fundamental consideration. The wild belief in portents shows that a transcendental character was attributed to the pestilence, mystic guessing and speculation powerfully aided the terror spread by the continual mortality. Accordingly, the calming of this terror, the soothing of this extraordinary *thanatophobia* was conceived of as one of the main tasks of relief. To alleviate this psychic situation, such scattered measures were introduced as those I have mentioned above: the prohibition of tolling of bells, of wearing black cloth and so forth. But much more important than these petty acts was the care for spiritual welfare and for an *euthanasia*. For the terror was certainly much augmented by the fear that one had to die without absolution and death in this world would be followed by death in the other. The ecclesiastic authorities did all in their power to do away with this *incubus*. Pope Clement VI in Avignon, who excelled, as we have seen in many good works, extended absolution to all the dead and dying and accorded plenary indulgence to all who were humble and contrite.⁵⁰ And who was not that in the face of death? Villani also records that a papal decree enjoined upon all priests their constant duty to administer the sacraments and visit and attend the sick.⁵¹ The example of the Holy Father has been followed by many (probably most) bishops. A striking example of the solicitous care for spiritual relief is conveyed by a Mandate of Ralph, Bishop of Bath and Wells, entitled "On confessions in the time of pestilence."⁵² He instructs his clergy, that, in *articulo mortis*, failing an ordained priest, people may confess to a lay person, even to a woman, in absence of a man. He orders that this be made public, that such

a confession, made to laymen, is valid for the remission of sins,⁵³ threatening, however, with excommunication those who should reveal the secrets thus obtained. This Mandate most probably gave extraordinary comfort to the destitute masses who trembled for their safety, in body or soul.

These examples may easily be multiplied. Spiritual comfort was carried into all corners; certainly, many clergymen may have forgotten their duty in this respect, taking to flight (particularly in Italy)⁵⁴; but great priests, like Johannes Tauler,⁵⁵ who became a support of Strasbourg in the critical period, always appeared where they were needed. Pope Clement VI consecrated the Rhône to make it a fitting resting place for some dead⁵⁶; while other bishops appeared on the spires of their cathedrals, blessing the dark pestilential winds (by making the sign of the cross in all directions), amidst the ringing of bells. These must have been impressive spectacles, calming the minds, reminding them of man's determination and the powers of his resistance. And so the work of the clergy was carried on, in all respects, enrolling, even illegally, young children, as the Dominicans did in Majorca, to replenish their ranks⁵⁷ in order to prepare the population for things that might come.⁵⁸

The population, however, was in many cases thrown back upon its own resources, its own methods of defense, and these were to degenerate into terrible manifestations of psychopathology. The people well sensed at first that their only chance lay in keeping away from human company, and thus they did not attend funerals or other public gatherings and functions,⁵⁹ deserted the streets and remained secluded.⁶⁰ But quite soon their fear was manifested in other phenomena, those usually accompanying panic. The Flagellants were among these.⁶¹ "During the first year there arose a wondrous new society in Hungary,"⁶² groups of ecstatic men who wandered menacingly into the various cities of German lands, everywhere preaching and

showing *mortification*; their insane antics initiated epidemics of panic, increasing that already present. They were suppressed with great difficulty by Pope Clement, as their influence impaired that of the clergy, drawing the mystically inclined into their own ranks.⁶³ A much more serious consequence of this panicky desire for self-defense was the persecution of the Jews. Very early in 1348 spread the ominous belief that the Jews had poisoned the wells and caused the pestilence on account of their vengeful hatred of Christianity. The persecutions commenced in Chillon, confessions were extracted by the usual methods and burnings of Jews occurred far and wide on the Continent. Strasbourg burned 2000 of them,⁶⁴ Mayence allegedly 12,000 and this practice could be brought to a halt only by very energetic measures on the part of the authorities. There is but one known instance of one in authority actually calling upon his subordinates to commence such burnings, and this is the case of the Landgrave Frederic of Thuringia, who writes in May, 1349, to the Burgo-master and Council of the City of Nordhausen, telling how he had burned his Jews in the honor of God and advising that they should do likewise.⁶⁵ With this exception, it seems that the outbursts were spontaneous acts of the terror-stricken populace (fear is the most dangerous and blinding emotion; it is the enemy of mankind!) and that they were not initiated by rulers and governments. In fact Pope Clement vi protected the Avignon Jews, and so did the Archduke of Austria, giving them refuge in his fortress, Kyburg, although some of the latter were lynched by the infuriated mob which broke through the gates. King Casimir of Poland accorded the threatened Jews asylum privileges, which is the reason for the dense Jewish population of Poland today.

These waves of excitement died down soon enough, but the memory of the plague was never erased. On the contrary, there arose with new intensity problems of vari-

ous order: social, scientific, moral and so on, with which people had to cope. First of all, the scarcity of labor made itself felt⁶⁶; wages rose rapidly and as early as September, 1349, strikes and combinations for higher wages began.⁶⁷ This, together with a fall in agricultural revenue,⁶⁸ provoked regulations and orders amounting to a qualified *corvée*, for example in England. One of these, dated June 18, 1350, required that everybody under the age of sixty "not living by trade or handicraft, nor possessing private means, nor having land to cultivate," must do work for wages obtaining in 1346, before the plague.⁶⁹ In every way authorities and people in general had learned the great lesson and prepared for new attacks; and well they did, for the plague remained more or less endemic in Europe, recurring in exacerbations, as those of 1361, 1382 and so forth. One by one preventive ordinances became enacted: Venice in 1382 orders the conscription and drafting of physicians, forbidding them to leave the city in times of epidemic, under pain of loss of citizenship.⁷⁰ Again Venice, together with Ragusa and Marseilles, in the 1380's established systems of quarantine, followed by other countries, England as late as 1516.⁷¹ In 1388 the first urban sanitation act was issued, in London, entitled: "the punishment of them which cause corruption near a City or great town to corrupt the air," in which was ordered the removal, avoidance and carrying away of every kind of "annoyance": garbage, entrails, dung, ordure of ditches and so forth.⁷² Scores of other rules and laws of sanitation followed.⁷³ On the scientific side, too, there is a tremendous outpouring of medical literature concerning the plague in the decades after 1348. Professor Sudhoff in a recent, still incomplete, statistical report⁷⁴ enumerates twenty-one plague-treatises dating from within five years after the Black Death, whereas before 1400 we have seventy-seven of them; twenty-nine of these from Italy, twenty-six from Germany and the rest from France, England,

Spain and other countries. The improvement is constant and obvious.

That improvement becomes particularly clear if we compare the reactions of people during the two greatest plague epidemics in history: the Black Death of 1348 and the famous "plague of Justinian" of 542 A.D., eight hundred years earlier. Whereas the fundamental human attitude of timidity and egoism was not less expressed at the earlier date (the funerals unattended, streets in desolation and so forth), and although certain slight attempts at scientific inquiry, such as rudimentary autopsies,⁷⁵ were then equally recorded, nevertheless it is interesting to note that contagiousness of the disease (the important feature from the point of view of prevention) was not then maintained with that confidence it received in 1348. Says Procopius:

Neither physicians nor other persons were found to contract this malady through contact with the sick or with the dead, for many who were constantly engaged either in burying or in attending those in no way connected with them held out in the performance of this service beyond all expectation, while with many others the disease came on without warning and they died straightway.⁷⁶

This remark suffices to show the thoroughgoing difference in the recognition of the nature of the danger which confronted the world at the beginning and at the end of the Middle Ages.⁷⁷

There remains after this wholesale slaughter a clear, true understanding concerning epidemic diseases, a true and honest conception of duties toward the community. The history of this plague marvellously shows a sudden attack upon a surprised mass of people with but few, at the top, retaining their cold blood, and a slow emergence of lucidity and sincerity, intellectual and emotional, after a most exhausting, pitiful confusion and struggle. A new face is put upon the earth; the modern world begins. In closing this survey, Haeser's words are truly fitting:

And yet, humanity never proved more convincingly that it is destined for an ever higher and more perfect physical and spiritual existence. For a rejuvenated generation rises from the graves, purified and steeled to the task which awaited it, to wit, to bring about the bright day of freedom after the long night of servitude.⁷⁸

REFERENCES

1. VIZ. STICKER, G. *Abhandlungen zur Seuchengeschichte*. I-II, Giessen, 1908-1910. D'IRSA, S. *The Black Death and the Medieval Universities*. ANN. MED. HIST., 1925, VII, 220, Ref. 1.
2. DEMAILLA. *Histoire générale de la Chine*. Paris, 1777, 9 vols. VIZ. CREIGHTON, C. *A history of epidemics in Britain*. Cambridge, 1891, I, 146.
3. In Oriente apud Cathaym, ubi est caput mundi et terre principium, signa horribilia et pavenda apparuerunt.
4. *Voyages d'Ibn Batoutah*. 4 vols. Ed. Société Asiatique, Paris, 1853, I, 227-9; IV, 309.
5. One of the best contemporary observers. JOH. CANTACUZENOS, *Imperator, tum monach. Christodulos, De rebus ad Andronico Palaeologo imp. necnon a se gestis libri IV*, 1320-1357. In Migne, *Patr. Lat.*, CLIII, CLIV. KRUMBACHER, K. *Geschichte der byzant. Litt.* München, 1891, p. 97.
6. CASQUET, F. A. *The Black Death*. London, 1908, p. 16. VIZ. GREGORIO, R. *Bibliotheca Scriptorum qui res in Sicilia gestes retulerunt*.
7. CREIGHTON, C. *Op. cit.*, I, 116.
8. HECKER. *Die grossen Volkskrankheiten des Mittelalters*. P. 89. CHENOT, A. *Hinterlassene Abhandlungen über die ärztlichen und politischen Anstalten beider Pestseuche*. Wien, 1798.
9. Main sources: Laurentius de Monachis (Lorenzo de Monaci), *Chronicon de rebus Venetorum ad an. 1354*, Ven. 1758; Ms. Vienna Cod. 6441; *Chronicon Petri Justiniani*, Ms. Cod. lat. cl. X 36a, Marciana; Rafaino de Caresinis (Caresino), *Muratori, Rer. Ital. Script.* XII, 417; Sanudo; *Chron. Trevisan.*, Laurentius also in *Muratori*, VIII, p. 137-150. VIZ. also MONTICOLO, G. *Cronache veneziane antichissime*. Roma, 1890.
10. ROMANIN, S. *Storia documentata di Venezia*. 1853-1861. Republished Venice, 1912, III, 155. *Cit. Raccolta Leggi M.C. e Spiritus*, 383.
11. Maggior consiglio, Spiritus, c. 154 y. *cit.* CECHETTI, La medicina in Venezia nel 1300. *Archivio Veneto* XXV, 361 sqq., 1883.
12. VIZ. the above sources, and BRUNETTI. *Venezia durante la peste 1348*. *Ateneo Veneto*, 32, 1909;

- KRETSCHMAYR, H. *Geschichte von Venedig*. Gotha, 1905-1920; HODGSON, F. C. *Venice in the 13th and 14th centuries*. London, 1910; and ROMANIN, mainly.
13. "E fu di bisogno mandare as epellire i corpi a S. Giorgio d'Alega, a S. Marco Boccalame, a S. Lionardo di Fossaruola e a S. Erasmo e tanto era la quantità de' morti che venivano sepolti l'un sopra l'altro ne' cimiteri e appena coperti. E fu preso d'alzare i cimiterii. E molti morivano senza penitenza e senza esser veduti. E tutti si tenevano ascosi per paura l'un dell'altro. E fu proveduto di mandar attorno pei sestieri piatte (peate) gridando *Corpi morti* e che coloro che aveano morti in casa, li dovessero buttar nelle piatte sotto grandi pene." SANUDO, *Chronaca e Spiritus* 383-386, ROMANIN. *Op. cit.*, III, 155.
 14. Viz. RUSKIN. *Stones of Venice*. I, 59 Traveller's ed.
 15. CECCHETTI. *Loc. cit.* p. 369. Such was, e.g., Andrea di Padova, licensed Dec. 31, 1348.
 16. *Ibid.* p. 379, elected: "... deficientibus omnibus medicis phisicis."
 17. *Chronicon majus Aegidii Li Musis*, abbatiss Sancti Martini Tornacensis. In DE SMET, J. J. *Recueil des Chron. de Flandres*. II, 279-281; 361-382.
 18. *Chronicon Pragense*, ed. Loserth. In *Fontes Rerum Austriacarum, Scriptores*. I, 395.
 19. According to Thorold Rogers. In GASQUET, *Op. cit.*, p. 156.
 20. *Prima Vita Clementis VI. BALUZIUS' Vitae Paparum Avenionensium*. Ed. G. Mollet, Paris, 1916. I, 241 sqq. "Et hac durante tempestate, dictus papa in Avinione rem fecit maxime caritatis."
 21. *Secunda Vita Clementis VI. BALUZIUS, Op. cit.*, p. 262 sqq. Quotes the *Liber Sapientiae*: "... ad sepeliendos mortuos vix vivi sufficerent." p. 268: "... nam ut eorum, quos illis temporibus mortis morsus tam rapidus rapiebat, citius possent corpora sepeliri, ne plus aer inficeretur quam esset infectus, duos grossos argenteos portantibus corpora pro quolibet corpore deputavit."
 22. *Prima Vita Clem.*, p. 252: "... nam pro pauperibus visitandis et alendis certos ordinavit medicos et alios qui eis in suis necessitatibus subvenirent in vita, et cum decedebant, etiam necessaria ad sepulturam ministrabant."
 23. *Breve chronicon clerici anonymi*, in DE SMET, J. J. *Op. cit.*, III, 14-18.
 24. Viz. HECKER. *Op. cit.*, p. 53.
 25. Ibn-ul-Khatib's Bericht über die Pest. In Arabic and German transl., ed. M. J. Müller. *Sitzungsb. d. München. Akad. d. Wissensch.*, 1863, II, 1. Ms. Escorial 1785. This Ms. contains two more "Pestschriften," those of 'Alī ibn Khātimah and 'Alī al-Lakhml-al-Shaqrī.
 26. *La Grande Chirurgie de Guy de Chauliac*. Ed. Nicaise, E. Paris, 1890, p. 167 sqq.
 27. "Parquoy elle fut inutile, et honteuse pour les Médecins: d'autant qu'ils n'osoient visiter les malades, de peur d'estre infectes: et quand ils les visitoyent, n'y faisoient guiers, et me gaignoient rien: car tous les malades mouroient, excepté quelque peu sur la fin, qui en eschappent avec des bubons meurs."
 28. "Et fut de si grande contagion (specialment celle qui estoit avec crachement de sang) que non seulement en sejourant, mais aussi en regardant, l'un la prenoit de l'autre. . . . La charité estoit morte, et l'esperance abbatue."
 29. Viz. Tr. II, Doctr. II, cap. 5, *De Apostematibus pectoris*, etc.
 30. HECKER. *Op. cit.*, p. 85.
 31. Viz. HAESER. *Gesch. d. Medizin*. III, 240.
 32. . . . solus hanelitus egri
Corrumpit sanos et eadem peste laborant.
 33. Nil valent abscondi, valuit fuga sola, sed ad quid?
 34. D'IRSA, S. *ANN. MED. HIST.*, N. Y., 1925, VII, 223.
 35. *Gentilis de Fulgineo Consilia*; *De peste Cons.* I, II. fol. 76, 77. Venice, 1514.
 36. NOHL, J. *Der schwarze Tod*. Potsd., 1925, p. 109.
 37. *Ibid.*, p. 112-119.
 38. SAHM, W. *Geschichte der Pest in Ostpreussen*. Leipzig, 1905, *Cit. NOHL, J. Op. cit.*, p. 130.
 39. "... Fecero qui da noi alcuni medici notomia . . .": *Brevi Annali della città di Perugia*, Corradi, *Annali* I, 203. Viz. also HAESER. *Op. cit.*, III, 137.
 40. CECCHETTI. *Loc. cit.*, p. 361.
 41. "... volo potius hic mori quam alibi vivere." CECCHETTI. *Ibid.*, p. 380.
Viz. also: CORRADI, A. *Annali delle epidemie occorse in Italia*. Bologna, 1865, II, 187 sqq.
 42. *Buch der Natur*, ed. Fr. Pfeiffer, Stuttgart, 1861, p. 109 sqq. "... der sterb nit vil schat . . . den, die dô verr hin dan wâren von dem geperg auf hôhen vesten, das was dar umb, daz sich der swaer luft her von den geperg, dâ er sich erhuob, naigt zuo der erden, und daz der hôch luft rainer belaib wan der nider."
 43. Friar John Clyn of Kilkenny. *Annals of Ireland*, ed. R. Butler, Dublin, 1849 (Irish Archaeological Society).
 44. *De pestilentia* 1348, etc.: "Fumum pulveris bombardarum, et nitri mane, ore et naribus exceptum prodesse, expertum est." COLLE, J.

- Medicina practica, sive methodus cognoscendorum et curandorum omnium affectuum malignorum et pestilentium. Pisauri, 1617, p. 510 sqq.
45. Coriarii, qui latrinas exportant, hi etiam, qui xenodochiis inserviunt et locis foetore gravi molestis, omnes fere a peste immunes conspiciebantur; venenum enim venenis debellatur, arcetur et expellitur.
 46. On current methods of prevention see also LAGUNA, A. Discurso breve sobre la cura y preservacion de la pestilencia. Salamanca, 1566.
 47. "Inter mortuos mortem expectans," according to Friar John Clyn of Kilkenny. (Viz. CREIGHTON. *Op. cit.*, I, 122.)
 48. Continuatio Chronici Guillelmi de Nangiac. Ed. Géraud, Soc. de l'hist. de France, II, 211.
 49. DITTMER. Das heilige Geist Hospital und die St. Clemens-Caland zu Lübeck. Lübeck, 1838.
HAESER, H. Lehrb. d. Gesch. d. Med. u. d. epidemischen Krankheiten. Ed. 3, Jena, 1882, III, 864 sqq.
 50. Tertia Vita Clementis VI. In BALUZIUS, *Op. cit.*, I, 273, 284 sqq.
 51. VILLANI, G. Cronica, XII. c. LXXXIV. Pompeo Pellini, Storia di Perugia, records the absence of confessors.
 52. Mandatum Radulphi, episcopi Bath. et Wellen. de confessionibus tempore pestilentiae. (Ex reg. Wellen. fol. 333), in WILKINS, D., Concilia Magnae Britanniae et Hiberniae. London, 1737, II, 745.
 53. "... in mortis articulo, si presbyterum rite ordinatum habere non valeant, ullo modo confiteantem juxta doctrinam apostoli alterutri sua peccata etiam laico, et si desit vir laicus, mulieri, quos etiam ad id faciendum tenore praesentium exhortamur in visceribus Jesu Christi, denunciante publice in locis praedictis, quod praedicta confessio facta laico in casu praemisso juxta doctrinam ecclesiae et canonica instituta, ad remissionem peccatorum eis multum salubris esse poterit, et prodesse."
 54. NOHL, J. *Op. cit.*, p. 150.
 55. His sermons: Joannis Tauleri des heilige lerers Predig, fast fruchtbar zuo ein recht christlichen leben, Basel, 1521; On Tauler: SCHMIDT C. Johannes Tauler von Strassburg. Beitrag z. Gesch. der Mystik u. d. religiösen Lebens im XIV. Jh. Hamburg, 1841.
 56. HECKER. *Op. cit.*, p. 48.
 57. GASQUET, F. A. *Op. cit.*, p. 66.
 58. As in an old German text (Geiler v. Keisersperg), *Cit.* KOTELMANN, L. Die Gesundheitspflege im Mittelalter. Hamburg, 1881, p. 214: "Pestilenz es fahet an, nun sei yed'man gerüst, das man bereit sei."
 59. Viz. Geiler von Keisersperg, Postill., etc., Strassburg, 1522; KOTELMANN, L., *Op. cit.* p. 214, 254. et al. loc.
 60. Fleeing as before a storm; Petrarch's famous image:
... Poi repente tempesta
Oriental turbò sì l'aere e l'onde
Che la nave percosse ad uno scoglio.
Sonnetti e Canzoni, Pte IIIa, canz. III.
 61. LECHNER. Die grosse Geisselfahrt des Jahres 1349. Historisches Jb. 1884, v, 437-462.
 62. Die Cronica van der hilliger Stat van Coellen. Cologne, 1499, fol. p. 263: "In dem vurss jair erhoiff sich eyn alzo wunderlich nuwe gesellschaft in Ungarien. . . ."
 63. Quinta Vita Clementis VI, Petrus de Herenthals. In BALUZIUS. *Op. cit.*, p. 298 sqq., 303.
 64. BASNAGE. Historie des Juifs. La Haye, 1716, IX, 664, 679, *Cit.* HECKEN. *Op. cit.*, p. 71.
 65. Ms. Stadtarchiv Nordhausen, repr. HAESER, *Op. cit.*, III, 181: "Ir Ratesmeyster vnde zat der Stat zu northuzen wysset, daz wir alle vnze Joden haben lozen burnen, also wyt alse unze lant sin, vmme dy groze Bosheyte, dy sy an der Krystenheit haben getan, wenne sy die Kristenheit getot wolden haben mit vor gift, dy sy in alle borne geworfen haben."
 66. Diminution of French population after the plague: DE BOISLISLE, A. M. Le Budget et la population de France sous Philippe de Valois. Paris, 1875.
 67. THIERRY. Recueil des Monuments inédits de l'Histoire du Tiers État. p. 546.
 68. ROGERS, J. E. TH. A history of agriculture and prices in England. Oxford, 1866, II.
 69. CREIGHTON, C. *Op. cit.*, I, 181. (Foedera III, 198.)
 70. CECCHETTI. *Loc. cit.*
 71. CREIGHTON, C. *Op. cit.*, I, 290.
 72. COULTON, G. G. Social life in Britain from the Conquest to the Reformation. Cambridge, 1918, p. 330.
 73. Viz. also KÖHLER, J., Beitr. z. öffentl. Gesundheitspflege deutscher Städte im Mittelalter, Vierteljahrsschr. f. gerichtl. Med. u. öff. Sanitätswesen, 3. Folge, IX, 1.
 74. SUDHOFF, K. Pestschriften aus den ersten 150 Jahren nach der Epidemie des "schwarzen Todes," 1348; Arch. f. d. Gesch. d. Med., Leipz., 1925 (Dec.), XVII, 241-291.
 75. PROCOPIUS. History of the Wars. II, 22, 29: *τινες λατρῶν . . . δερυνάσθαι τῶν τετελευτηκῶτων τὰ σώματα ἐγνώσαν καὶ διελόντες τῶν βουβῶνων τινάς, ἀθρακος δεινόν τι ἔργμα ἐμπεφυκὸς εὔρον.*
 76. *Ibid.*, II, c. 22, 23.
 77. Sudhoff, in MEYER-STEINEG, TH., and SUDHOFF, K. Geschichte d. Med., Jena, 1922, p. 228, briefly contrasts the two epidemics.
 78. HAESER, H. *Op. cit.*, ed. 3, III, 99.

COPHO'S "ANATOMIA PORCI"*

By LE ROY CRUMMER, M.D.

OMAHA, NEBRASKA

ONE of the minor products of the famous School of Salerno was Copho's "Anatomia Porci." This little tract is mentioned in almost every discussion of this famous medieval center of Southern Italy, but its importance is certainly not to be measured by its length. The references I have been able to find do not include the translation into any of the modern languages, although it was printed many times in comparatively late Latin.

Sudhoff has taught us that it is useless to attempt to identify an author as an individual even at much later periods, so it is perhaps not worth while to try to pierce the traditional identity which has acquired the name "Copho." Choulant definitely states that nothing is known of Copho; that even his period is quite uncertain. Baas places the "Regimen Sanitatis Salernitanum" at 1101, and the "Anatomia Porci" somewhat later; in this, he undoubtedly follows Sprengel who gives Copho the date 1150. De Renzi attributes a real personality to Copho, Junior, and cites 1120 A.D. as his period, only to plunge immediately into a discussion as to whether the "Anatomia Porci" was taken from the classic authors, particularly Galen, as frankly was the case with his "Ars Medendi."

Accepted or disputed, the personality of this author or the source of his material seems to me of less interest than the tradition and influence of this tract which from the twelfth century until at least the time of Mundinus, or strictly speaking until the work of Mundinus was known and accepted, represented the required professional knowledge of anatomy. In fact, Mundinus did not entirely displace Copho, for there were several editions of "Anatomia Porci" published in the sixteenth century.

Manuscript copies of Copho's work are

* Submitted for publication August, 1926.

rare. De Renzi (1856) copied the Breslau codex, and later (1907) Schwarz carefully described a very early copy which he found in the Royal University Library at Würzburg. Haller refers to a codex in England, B. E. Tyson, No. 4161. There is also a manuscript in Hamburg, and although it is not properly catalogued, the Munich library possesses the text included in a collection of manuscripts.

Choulant in his "Handbuch der Bücherkunde für die Ältere Medizin" (1841) gives the following bibliography of the printed editions of Copho:

1. Tractatus de arte medendi ominis morborum curam auspicaturis, apprime necessarius. (Acc. Anatomie Porci) Hagenau, Kobian, 1532.

2. eb. In Joanitti isagoge in artem parvam Galeni . . . Casserius, Argentore, 1534. Cammerland.

3. eb. an J. G. Jac. Bernhold, Initia doctrinae de ossibus ac ligamentis corporis humani. Nurenberg and Altdorf, 1794.

The only separate appearance of "Anatomia Porci" is in:

DRYANDER: Anatomiae. hoc est corporis humani dissectionis pars prior . . . Item. Anatomia Porci, ex traditione Cophonis, et Anatomia Infantis, ex Gabriel de Zerbis, Marburg, Cervicornus, 1537. 4to.

Dr. Charles Singer tells me that the text is also given in Severinus: "Zootomia Democritaea," etc.,¹ and in the Lyons, 1531, edition of the works of Mesuë, the younger. In more recent years, it may be found in De Renzi, "Collectio Salernitana,"² and in Schwarz, "Die Medizinischen Handschriften der Kgl. Universitätsbibliothek in Würzburg."³

The text of this manuscript of the

¹ Noribergae, 1645.

² Naples, 1852-1859, IV, 388-390.

³ Würzburg, 1907.

"Anatomia Cophonis" differs in many particulars from that given in Dryander. It is much longer and contains much more comment on physiology. It seems probable that this increased text is due to interpolations of the scribes, although it is of course possible that this early manuscript represents the true work of Copho, and the other codices are condensations.

In the 1532 Hagenau edition, the "Anatomia Porci" follows the "Ars Medendi" on folio f.1 without separate title or other indication of change in text.

In the 1537 edition, Dryander introduces "Anatomia Porci" with an interesting preface (see below) a page in length, which is followed by his transcript of the anatomy beginning on h.1, and occupying in all less than four pages of this small quarto. Brief as it is, this represents the sum and substance of anatomical training required for the profession of medicine for at least four centuries.

The following translation from the Dryander text is offered as an exhibit of medieval anatomical tradition:

SHORT PREFACE TO THE ANATOMY OF THE PIG

The anatomy of Copho, the most celebrated doctor of his age, which he left touching the dissection of the Pig, it has been our pleasure, learned reader, to put at the end of our figures, that you may find it a preparatory exercise to this noble art of anatomy, or a supplement thereto. I do not think that young students of medicine should be allowed at first to dissect the human body with their dirty hands, as they say, before they have acquired the rudiments of anatomy from using calves, goats, pigs and monkeys, if like Galen, they have a sufficient number of those animals, because these animals have a good share of their bodies in position similar to the bodies of human beings. But if anyone has an unusually great desire for knowledge on this subject, or, if he has remarkable skill in exercising this art, let him attempt a dissection of other animals which have little or no likeness to the bodies of men, such as frogs, hedgehogs, fish, dormice, birds and hens and the rest of that type. I think that such a one by no means departs from the example we have

set; I even contend that he increases to a marvelous extent our valuable collection in this art. For whence, Aristotle, Pliny, Galen, would have got such deep knowledge of these things, if they had not put their hands to Anatomy, I leave, Reader, to your conjecture.

THE ANATOMY OF THE PIG FROM THE BOOK OF COPHO

Since the composition of the inside of the human body was entirely unknown, the ancient physicians, and especially Galen, decided that the different parts might be shown through the Anatomy of the lower animals. And although certain animals, such as the ape, are like us on the outside, none are found that are so like us inwardly as the pig, and therefore the pig is used in this Anatomy.

In the Anatomy, there is a correct method of division, which is as follows: You are to turn the pig on its back, cut his throat through the middle, and then you will first find the tongue, which is tied by certain nerves on the right and left, which are called motor. Because as they come from the cerebrum to the lungs, they are turned towards the tongue and through them it is moved to speech. Nearby are fleshy glands, which are called Pharynges, and the inflammation of them is called by a similar name, there are here also large glands in which moisture gathers and causes hoarseness.

In the root of the tongue there arise two passage ways, the one the windpipe, through which air goes into the lungs and esophagus through which food is sent into the stomach, the windpipe is above the esophagus and above this there is a certain cartilage which is called the epiglottis, which is closed sometimes so that no food or drink can get to it, and sometimes it is open so that air can go in and out.

Between the windpipe and the esophagus is a place which is called the isthmus, this is between two recesses, in which at times humor may collect and make an aposthume which is called angina, that is sore throat, at other times this inflammation is entirely outside and is called quinsy.

Then you should separate the windpipe and the esophagus and you will find the lungs and heart. But the heart is more on the left side, each of these is contained in its own capsule. In the capsule of the heart pus collects which makes peripneumonia.

And then you will see a vein which is called

concave, which comes from the liver through the middle of the diaphragm and enters the auricle of the heart, and this makes an artery from which arise all the arteries which are distributed to the neighboring parts in which humor collects which makes congestion; this sometimes collects outside of them and makes breathlessness and sometimes collects both inside and outside and makes orthopnea. If you wish to prove that the lung is hollow you can do so by inflating it with an introduced reed. Under these parts is a membrane called the diaphragm which divides them from the digestive system and which is joined to the covering of the ribs. In this moisture collects causing pleurisy.

Then you ought to return to the digestive system and compute the distance from the esophagus even to the seventh vertebra, and the mouth of the stomach begins above the diaphragm, but the stomach is below. Under the stomach is the intestine which is called the pylorus, under the pylorus is the duodenum, under the duodenum is the jejunum, under the jejunum is the cecum, under the cecum is the cul-de-sac,⁴ under the cul-de-sac is the rectum, and there are certain small intestines which are called lateralities in which occurs the ileac passion.

On the right side, under the fundus of the stomach is located the liver, in whose substance there is a sort of a bladder which is called the gall bladder, above the liver there are two membranes, the omentum and ducts, which are tangled like a net. What you see there large and fat is called the omentum; what is thin is the duct which goes all the way to the spleen and through which run the blood vessels by which melancholy is taken from the liver to the spleen. The spleen is also an oblong organ in the left lateral position, the places which are under the spleen and liver are called hypochondria. Then you ought to take out all of the internal organs and in the middle of the spine a great artery should be seen under which is located the great vein, which artery is made from all the branches of the arteries of the head which are joined in

⁴ The literal translation of the text "sub ieuno est orbum, sub orbo, saccus, sub sacco loguno" seems to require an extra anatomical division of the large intestine, but in the Würzburg manuscript this reads "sub ieuno est orbus vel saccus."

this one great artery which runs down to the lumbar region and from there transmits the various arteries to the right and left lower limbs. There a big vein is made, descending from the arteries of the head, which goes all the way to the kidney and divides and makes the vena chillis⁵ in which are located the venous capillaries, which cannot be seen on account of their extreme smallness, by which the urine with the four humors is sent to the kidneys.

Then you will see there two channels which are called ureters and by them the urine flows into the bladder. Now they are fastened to the bladder and also go through a certain membrane by which all of the intestines except the rectum are shut off which is called epigorontysmeon⁶ of the colon; when this is broken, the intestine falls into the scrotum, above which is the omentum.

End of the Anatomy of the Pig
according to the tradition
of Copho.

⁵ The λ -shaped branching of the inferior vena cava was of great interest to the early anatomists, who exercised great ingenuity in giving a proper description of it. The following transcripts from early French and German sources show the interest taken in the *Vena Killis*.

"La Veine caue, autrement appelée la veine du foye, en Arabic s'appelle Hanabud, vulgairement Vena Killis, par ceste veine caue, le sang après qu'il a esté engendre du foye, est distribué par tout le corps pour le nourrir." (From a French fugitive sheet of about 1560.)

"Die ader vena Killis hat iren Vrsprung von der Lebern- dar von sie alle ir geblüt nimbt/und gleich wie ein Baum in dem erdtrich sein wurtzel vnd vrsprung hat/vnd sich nachmals in ein stammen vnd vil äst aussteylt/Also die ader Killis ist in die Lebern eingeffantz von dannen sie iren vrsprung vnd feuchten aussziehet/nachmals ein starcker stamm wirdt/der sich vnter sich vnd vbersich in äst aussteylt/ als nemlich in das Haupt/Arm/vnd brust/ Nachmals vnthersich in die fesslein der natur/vnd beyde schenckel/auch in die adern des Massdarms Emoroides genant." (From *Ausslegung und beschreybung der Anatomii*. Nurenberg, 1547.)

⁶ I am much indebted to Dr. J. A. Rice, Jr., Professor of Classic Languages, University of Nebraska, for revising my translation and helping me with some very difficult late Latin, but even with his erudition, the translation of "epigorontysmeon" was quite impossible.

SOME MEDICAL WORDS IN JOHNSON'S DICTIONARY*

By CHARLES W. BURR, M.D.

PHILADELPHIA, PA.

SAMUEL JOHNSON defines lexicographer, in the first edition of his dictionary, published in 1755, as "a writer of dictionaries: a harmless drudge, that busies himself in tracing the original, and detailing the signification of words." I have no expert knowledge of lexicography, and my little paper, therefore, must not be taken as a serious and profound study by a specialist in language. Nevertheless, we can get something worth while out of Johnson, because dictionaries are interesting and instructive, if one pays attention not to the trifling matter of spelling, which in more virile ages gentlemen neglected, possibly somewhat too much, but to the history of changing meaning, and the varying respectability of words. Language is aristocratic in spirit, and caste rules. Words are both the despots of thought and most useful and industrious slaves. They change their social level often and the mortality rate is low in those which reach verbal maturity, but very high during the period of infancy, and still-birth is not unknown. An old word, which during centuries of use has become incrustated with many connotations, may hold a whole nation in unconscious but absolute intellectual bondage; a new one, or an old one, stripped of its old clothes, and newly washed and dressed, may lead a rebellion, rarely, a revolution in thought. Such revolutions have been rare, rebellions very frequent; but after a rebellion is over, as a rule, things are even more what they were, than they were before; a paradox, but true.

There are more than a few words, which, if we knew their origins, their biographies, why they now and again changed their meanings, and what those meanings were,

would reveal the whole history of mental development since man created a vocabulary. It is this which makes dictionary reading interesting. But in too large doses, too frequently repeated, such reading makes a man feel himself to be an intellectual drudge, or, if he be of less modest make up, he becomes a boresome pedant.

My title is too broad. The limitations of time and space compel me to choose only a few words for study. I have omitted almost all botanical and chemical terms, and have included a few common words used in a medical sense. I have chosen Johnson, rather than Dr. James' medical dictionary, because I wished to show what the attitude of the reading public of Johnson's time was to medical thought, rather than the purely professional point of view.

The going-out and coming-in of words is of interest. A living language is rich in slang, a not infrequent breeding place for new words, both in the common speech and in learned terminology. The users of a dying one think it is too respectable, as it stands, for them to encourage new words; really they are intellectually too inert, emotionally too frozen, too near the palsy of mental death to create new tools of thought. Usually a slang word, and it matters not whether its paternity is of the gutter or the college cloister, dies in early infancy, but sometimes it proves its worth and becomes a wholly respectable, or indeed aristocratic, member of verbal society. The reverse is also true, a nice, clean word, heard constantly in the most polite society, becomes for some reason taboo and, finally, either obscene or obsolete. This seems to be especially true of words concerning the human body. Sometimes, as has happened in medicine since Johnson's time, the philosophy of a science changes so much that

*Read before the Section on Medical History of the College of Physicians of Phila., April 22, 1926.

many new words are created and old ones either die or take on a new life with new meanings. Again, words that are in general use and without technical meaning are sometimes adopted into some vocabulary of science, and either pass out of common use altogether or are used both commonly and technically.

There has been a greater change in medical, and indeed all, scientific nomenclature since Johnson's dictionary was first published, 171 years ago, than in any similar interval of time since the Renaissance. The reason is simple: the period, from the eighteenth century on, has been, and continues to be, one of tremendous intellectual activity, especially in the study of things and material forces, but the imponderables have been neglected because the ferment which stimulates interest in them has been lacking. New sciences have been created, even in our own generation, and have compelled the creation not only of new words, but entire vocabularies. Bacteriology is an example. New, or seemingly new, points of view have been taken by students, and these have needed new words, new tools for their description. Chemistry is an illustration. The present vocabulary of biological chemistry is an unknown tongue to men who were students of chemistry thirty years ago, unless they have kept up, day by day with never a holiday, in following its growth. The word biology is not even mentioned by Johnson. Physiology he defines as "the doctrine of the constitution of the works of nature." This is all he says about it, omitting all reference to the functions of the body. How new the present use of the word is, is shown by the fact that some of the older schools of medicine in America named the chair now called physiology, "the institutes of medicine," and changed its title only in very recent years. Hygiene Johnson does not even list. The word was introduced long before his time, but the subject attracted so little attention, became so dead, after the fall of Greco-Roman culture (indeed early and medieval Christian civilization

was so other worldly, so contemptuous, when not afraid, of the human body) that the idea of care of health had almost to be resurrected in our own time. Of course the Johnsonian age, and the period before it, had gotten away in large degree from other worldliness; but it had little use for hygiene, because the world philosophy of his day was that people not strong enough to survive did not deserve to. This is shown indirectly in his definition of the noun bath, in which the first thing spoken of is medical, i.e. curative baths, and only later and with little emphasis is a bath as a cleaning (i.e., hygienic) agent apart from a curative process, referred to. Bathing for pleasure was common in classic times in Greece and Rome, went out of fashion during the time the barbarians of western Europe were attaining civilization, and has again, only in our own time, become common.

One is impressed by the fall from respectability of many popular semi-medical words that concern the body and its functions. Several that, in Johnson's day, were respectable, if not polite, are now banished to the stable or its modern substitute, the garage. Privy (the noun) he defined, in a phrase still used in my boyhood, as "the necessary house." Puke: to spew, to vomit; Mull-grubs: twisting of the guts; Guts, itself, and several other words were used by everyone in the eighteenth century and carried no connotation of dirty-mindedness. I wish some student would explain the riddle of their fall from a high verbal social level. With us Americans, a mawkish daintiness, an effeminate prettiness in taste, partially explains the change in usage. For example, he would be a brave man in America (it is not the case in England) who, speaking of a female dog, called it, what it is, a bitch; and even medical students too often in their histories call legs and arms extremities, somewhat to the confusion of those who read hospital notes and are compelled to study out which extremities are meant. Only recently a metropolitan newspaper refused to print the

word syphilis, in a popular article of mine, not because of fear of a law suit (it was not used concerning a person) but, as the editor said, because his readers would be shocked at seeing it in print. I was compelled to replace it by a long paraphrase, which was probably misunderstood by many readers, and undoubtedly assumed to have a dirty meaning by some. Leech, one of the designations of medical men common in Johnson's time, has gone out altogether. He defines it as "1. a physician, a professor of the art of healing; [whence we still use cowleech.] 2. a kind of small water serpent, which fastens on animals, and sucks the blood." I suspect that, if asked why he called it a serpent, he would have answered, as he did on another occasion when being cross-examined by a highbrow female (at least my recollection is that it was that kind of person), "ignorance, madame, pure ignorance." Frith, the artist, who made no pretence of being an etymologist, in the prologue to his life of John Leech stated: "Leech [spelled Leich] is an old Saxon word for surgeon." Cynical amateur students of word derivation have claimed it came in use first figuratively, in illustration of a leech-like attachment shown by practitioners to the pocketbooks of patients. This, I need not say, is an untruthful libel. Leechcraft also was a proper and sober word meaning "the healing art."

Physician is an old word, and Johnson defines it as "one who professes the art of healing." He intended no slur in using the word "professes," but is it not time that, in the public mind, it should be replaced by knows or studies? I said he meant no slur, but he quotes, in illustration of the word, the following from Shakespeare's Timon:

Trust not the physician.
His antidotes are poison,
and he slays
More than you rob.

Johnson, being a Tory, in verbal likes and dislikes as in everything, evidently disapproved of surgeon as modern, for he

says: "Surgeon (corrupted by conversation from *chirurgion*). One who cures by manual operation: one whose duty is to act in external maladies by the direction of the physician." Some physicians think it would be a proper penance for professional conceit if modern surgeons were compelled to read this definition daily. He lists *chirurgical*, but not *surgical*. His first definition of the noun patient gives it a meaning which today is obsolete. It runs: "that which receives impressions from external agents." The second definition coincides with present-day usage. It is: "a person diseased. It is commonly used of the relation between the sick and the physician." He gives as disrespectful designations of physicians "Saltinbanco. (*Salare in banco*, to climb on a bench as a mountebank mounts a bank.) A quack or mountebank," and mountebank itself.

Johnson may have had some lingering sympathy with the lore of the Middle Ages, because he defines alchemy as "the more sublime and occult part of chymistry which proposes [not professes] for its object, the transmutation of metals, and other important operations." About thirty years after the dictionary was printed, a cardinal and Prince of the Holy Roman Empire (who, incidentally, was not a man of great acuity of mental vision though admittedly of much learning) Cardinal de Rohan, was bled white, financially, by pretenders in the pseudo-science. But Johnson was a different type of man and I cannot conceive of him accepting alchemy, if he could have been induced to investigate it, although transmutation, which was only a small part of alchemic theory, seems now to be a fact, a thing occurring in Nature's laboratories. He had, unfortunately, little or no interest in natural science, no scientific curiosity, and lacked entirely the high type of imagination that causes awesome wonder at that great machine, the universe. He also lacked the still rarer and higher kind of imagination that can conceive the world as idea projected into seeming space. You will

remember his boy-like argument against Berkleian idealism.

Today, mental healing, faith cures, spiritualism and a thousand and one cults, very attractive to people who have lost the anchorage of faith in the historic religions and who yet must have some non-material thing to cling to, not only are widespread but influence popular medical thought. I quote, therefore, what Johnson says about occult. He defines it as "secret, hidden, unknown; undiscoverable." He quotes Joseph Glanvill's book, "*Scepsis Scientifica*," in this connection as follows: "An artist will play a lesson on an instrument without minding a stroke; and our tongues will run divisions in a tune not missing a note, even when our thoughts are totally engaged elsewhere: which effects are to be attributed to some secret act of the soul, which to us is wholly occult, and without the ken of our intellects." He does not even hint that occult has any connotation concerning other worlds or the dead. His definition of superstition was surely written by a good old Tory member of the church of England, who did not, being, from his own point of view, a hard-headed, sensible man, believe in any nonsense. Of course we can not blame him that, when a boy, he was touched for the king's evil, a procedure based on a popular superstition which lingered long in England, because he was an eighteenth century product and not a twentieth century American boy, whose parents would ask his permission before taking him for treatment. Years after his juvenile experience (I wonder what thoughts and memories arose in him, as he read the proof sheets of his assistant's work) he defined the king's evil as "a scrophulous distemper, in which the glands are ulcerated, commonly believed to be cured by the touch of the king."

Some, apparently purely technical, medical words of the eighteenth century have gone out of use entirely, for example: "Obstipation; the act of stopping up any passage," presumed of the human body. Today, elderly and scholastically, if not

pedantically, inclined physicians sometimes use it to mean a very obstinate constipation. "Omoplate: the shoulder blade," appears in Gould's dictionary but is not in common use. Ablactate, achor, and insanable are all obsolete; To ablactate: "to wean from the breast"; "Achor: A species of the herpes: it appears with a crusty scab, which causes an itching on the surface of the head, occasioned by a salt sharp serum oozing through the skin"; "Insanable: incurable, irremediable." Imposthume, which the New Oxford English Dictionary marks rare, is, I think, today only used by poets who affect old words, but is dead in medical speech. It means "a collection of purulent matter in a bag or cyst." Pepasticks were "medicines which are good to help the rawness of the stomach and digest crudities." Phlebotomist is "one that opens a vein: a bloodletter." The name has gone out, but bleeding is regaining a well-deserved place in therapeutics. Its history is a splendid illustration of fashion in medicine, and that sometimes truth prevails. It became so common as to kill many, then it passed out; today it is used on proper occasions. Phlegm throws much light on the medical philosophy of Johnson's day. He defines it as "the watery humour of the body, which when it predominates, is supposed to produce sluggishness or dulness." A "phlegmagogue is a purge of the milder sort, supposed to evacuate phlegm and leave the other humors." Phlogiston is a "chemical liquor extremely inflammable." More accurately it may be defined as the hypothetical element contained in combustible substance, and separated from them by combustion. When Priestly discovered oxygen, in 1774, he did not realize he was killing the theory of phlogiston, which indeed he continued to defend, and which had ruled all chemical thought. "Procatarxis is the preexistent cause of a disease, which cooperates with others that are subsequent, whether internal or external; as anger or heat of climate, which being such an ill disposition of the juices, as occasion a fever;

the ill disposition being the immediate cause, and the bad air the procatartick cause." Moxa is "an Indian moss used in the cure of the gout by burning it on the part aggrieved." "Neurotomy" is defined as "the anatomy of the nerves," not their sectioning. "Nidorosity; eructation with the taste of undigested raw meat." Modern students of medicine should learn from this what close observers those old fellows were, and how they used their smellers, lacking laboratory technicians to make examinations for them. Obmutescence means "loss of speech." Johnson's only definition of orgasm is "sudden vehemence," and "priapism is a preternatural tension." "Meliceris is a tumor enclosed in a cyst, and consisting of matter like honey; it gathers without pain and gives way to pressure, but returns again." Menstrual is defined as "monthly, happening once a month; lasting a month," but there is no reference to the physiological meaning, but menstuous is defined as "having the catamenia." "Midriff, the diaphragm" has passed from use, and is passing out of memory. Moidered, which seems not to have been a technical medical word, meant crazed. Alienation, "applied to the mind, means disorder of the faculties," but alienist is not in the dictionary. Pituitous meant "consisting of phlegm," but pituitary is omitted. Pineal, Johnson defines as "resembling a pineapple. An epithet given by Descartes from the form, to the gland which he imagined the seat of the soul." He quotes Arbuthnot and Pope: "courtiers and spaniels exactly resemble one another in the pineal gland."

If a man had leucophlegmacy he suffered from "paleness, with viscid juices and cold sweatings." Eating, if you wished to be very scientific, you called manducation, and yawning, oscitancy. The pain we call osteocopic, the men of Johnson's day called osteocope. Ovary is defined as "the part of the body in which impregnation is performed." A ptisan was "a medical drink made of barley decocted with raisins and liquorice." It has always seemed to me a

pretty word, recalling times when life was simpler, and pleasures less febrile in their gait. Puberty is quaintly defined as "the time of life in which the two sexes begin first to be acquainted," and he quotes Bacon as to the cause of change of voice as follows: "when much of the moisture of the body, which irrigates the parts, is drawn down to the spermatical vessels it leaveth the body more hot than it was, whence cometh the dilatation of the pipes." Adolescence, in Johnsonian verbiage, means "the age succeeding childhood, and succeeded by puberty: more largely that part of life in which the body has not yet reached its full perfection." Puberty, today, means the period at which sex feeling is differentiated and fruitful sexual action has become possible, whereas adolescence is the long period between puberty and complete maturity. These two words illustrate how time changes meanings so quietly that people do not realize the change that has taken place. Seminal means "belonging to the seed," but semen is not listed. Boil, he spells bile, and writes: "this is generally spelt boil; but I think less properly." The illiterate peasant of today in England, still more frequently in Ireland, and literate and illiterate people alike in isolated parts of America, follow the example of old times when they speak of a "bile." Rabid is "fierce, furious, mad," but rabies is not given. A raspatory is a "Chirurgion's rasp" and, in my innocent ignorance of things surgical, it may still be in use. A pessary "is an oblong form of medicine, made to thrust up into the uterus upon some extraordinary occasions." It is curious that when Johnson comes to rum, his definition is as follows: "1. A country parson. A cant word. 2. A kind of spirits distilled from molasses." I think the juxtaposition was accidental, but he had at times a brutal, if not a pretty wit, and, if his ghost could write a dictionary today, I am sure we would find therein not only the meanings of words but his opinions on many things, and they would not be hidden in a cryptogram. To salivate is "to purge by the salivary

glands." Sanation is "the act of curing," and sanitation has no place. "Pus is the matter of a well digested sore," and he quotes Arbuthnot as saying: "acid substances break the vessels and produce an ichor instead of laudable pus." No medical student of today hears of laudable pus, unless he be fortunate enough to have scholarly men for his teachers who interest him in medical history, but even as late as my undergraduate days, one of our teachers, the junior professor, a man of learning, wise in surgical judgment but incorrigibly attached to the errors of the dead past and scorning "bugs," made us poor students learn all about laudable pus and its opposite ichor. As the older teacher in the medical school made us damn all pus as the result of bad surgery, we were in somewhat of a mental quandary.

Though heredity is not mentioned, and the definitions of hereditary and hereditary contain no reference to biological inheritance, Johnson evidently was a strong believer in it, as is proved by the following definitions: "Degeneracy: A departing from the virtue of our ancestors. Degenerate: (adv.) 1. unlike his ancestors: fallen from the virtue and merit of his ancestors. 2. unworthy, base. Degenerate: a deviation from the virtue of ones ancestors."

Since Johnson's day the point of view concerning mind has so changed that a new vocabulary has arisen, both in psychology and psychiatry. Neither of these words, so fashionable today, were in use in Johnson's time. A few old words concerning mental functions have survived, and it is interesting to read his definitions and compare them with our conceptions. To him hallucination meant "error; blunder; mistake; folly," and nothing more. Men more learned in the technology of mind already had other ideas, but not the general reading public. Epilepsy (a disease well described clinically in the book ascribed to Hippocrates) was, in Quincy's opinion, quoted by Johnson: "An convulsion, or convulsive movement of the whole body, or of some of its parts, with a

loss of sense. A convulsive motion happens when the blood, or nervous fluid runs into any part with so great violence, that the mind can not restrain them from attraction." Apoplexy is "A sudden deprivation of all internal and external sensation, and of all motion, unless of the heart and thorax." This word has a curious history, briefly related by Gowers in his "Diseases of the Nervous System." Etymologically it means a striking-off, and was used by the Greeks, as it is today, to signify sudden loss of consciousness with loss of voluntary motor power. Since cerebral hemorrhage is a very common (Gowers states the most common) cause of apoplexy, cerebral hemorrhage and apoplexy became synonymous. Then the hemorrhage came to be spoken of as the apoplexy, and finally, today, we speak of hemorrhages in any organ as an apoplexy. Catalepsy, which today is obsolete, is "a lighter species of the apoplexy, or epilepsy." Lunacy is "a kind of madness influenced by the moon: madness in general." The belief in the moon's influence on the mind is probably one of the oldest of false beliefs, passed on for many milleniums, and showing well the power of racial tradition. Lycanthropy is another instance of the power of the dead hand of tradition. It is a "kind of madness in which men have the qualities of wild beasts." The insane rarely have the delusion that they are changed into, or rather are, animals, but popular belief credited them with really having those qualities. A Phasm, to Johnson, was an "appearance; phantom, fancied apparition." This word has gone out unless it has been resurrected by some recent writers on the occult. I have not met with it in any recent paper or book. Phrenitis is, of course, "madness; inflammation of the brain," and there are signs of its revival. Melancholy is "a disease, supposed to proceed from an redundance of black bile; but it is better known to arise from too heavy and too viscid blood: its cure is in evacuation, nervous medicine, and powerful stimuli." Nervous, he defines as "1. well

strung, strong, vigorous. 2. (in medical cant) having weak or diseased nerves." One of the differences, today, between American speech and English is that, with us, nervous always has the second meaning, in non-medical English, always the first. Imbecile meant "weak, feeble, wanting strength of either mind or body," and the verb "to imbecile," now obsolete, had nothing to do with feeble-mindedness, but according to Johnson, "is corruptly written embezzle and means to weaken a stock or fortune by clandestine expenses or unjust appropriations."

Johnson's definition of popeseye led me far astray and made me mistake a culinary term for an anatomical one. Popeseye, according to Johnson, is "the gland surrounded with fat in the middle of the thigh: why so called, I know not." Gould, to whose dictionary I went for help, added to my confusion, because he defines "Poop, pope (origin obscure). A colloquial term used by football players to designate an injury to the front and outer side of the thigh which causes more or less disability." The New Oxford Dictionary cleared up the matter, saying, "Popeseye: the lymphatic gland surrounded with fat in the middle of a leg of mutton; regarded by some as a tit-bit."

Interesting papers have been written on the origins of the names of medicines, but I have only time to mention two. Laudanum, Johnson dismisses in rather a curt fashion, simply defining it as "a soporifick tincture, a cant word from laudo, Latin." He settles the derivation too summarily; the matter has been much discussed. Basil Hargrave in his "Origins and Meanings of Popular Phrases and Names" says: "There grows in Candia and Syria a shrub exuding a gum much valued for its healing properties. The Persians call it ladan, Latin,

ladanum. It appears that when opium was first brought to Europe it was thought to be this gum, and hence the name." Paregorick, given only as an adjective, is defined as "having the power in medicine to comfort, mollify and assuage."

The changes that have occurred in the meanings of the technical words I have quoted show better perhaps than the reading of any one book could do, the change that has taken place in medical philosophy since Johnson's time. Then humoralism still ruled. Today hormones have largely taken the place of humors. The ductless glands, then scarcely thought of, believed to be negligible and not considered worth study and investigation, now are held by some psychologists (not by physiologists, whose opinion is of much greater value) to be the determiners of personality. Physiology has become largely a branch of biochemistry, and chemistry is coming into closer and closer relation with physics. In Johnson's day therapeutics was entirely empiric, and the most useful medicines had been discovered centuries before by old wives, or been taken to Europe by travellers in savage countries. Today therapeutics is beginning to be rationalistic, and a few of our most useful remedies have been discovered by men working in laboratories and using animals for study. He was a brave man who ventured to intimate any blood relationship between man and other animals in Johnson's time. Today such relationship is well known, and animal experimentation has helped both man and beast. How great the change in our mental attitude toward our own nature has been, can be learned more quickly by comparing Johnson's dictionary with any dictionary of today than by any other method.

GOLDONI, CLINICAL DRAMATIST*

By FREDERICK EBERSON, PH.D., M.D.

SAN FRANCISCO, CALIF.

IN Venice, in the year 1707, Charles Goldoni was born. Since his infancy and early childhood were spent like those of millions of babies after his time, we shall pass over these periods. It is the early youth and adult life of Goldoni which interest us. Destined for medicine, then law, he finally became the great dramatist whose background and psychological reactions made him one of the most interesting personalities of an age. I have drawn freely on his own Memoirs for the material in this essay.

Goldoni, a clinical problem in himself, unconsciously brought to bear upon the characters of his one hundred and fifty comedies all of his introspective powers and the feminine sensitiveness so pronounced in his make-up. The psychiatrist is at liberty to call him narcissistic, introverted, a type of dementia praecox, any or all of the terrible names in medical literature. The fact remains that Goldoni knew how to reveal the "innards" of his actors all the more because he was himself such a keen analyst of motives and of psychic reactions in general.

To what extent, if any, is Goldoni's early medical training shown in his writings? Simpler by far is an attempt to correlate a man's literary achievements with his character and peculiarities than to explain the effects which early education and training may have had on the success attained in his works. Yet one is tempted to attribute much to the clinical powers of observation and analysis and to the keen intuitive sense of this man who might have been a practicing physician. Upon further reflection, one feels equally justified in merely crediting Goldoni with specific aptitude for a type of literary work demand-

ing the very same qualities which characterize the successful man in clinical medicine. In other words, Goldoni, the Dramatist, might have been a physician who wrote comedies or a dramatist who might have been a successful practitioner of medicine, to the disparagement of neither. This question is raised here because there is a common tendency in biographical writings to attribute to early specialized training any unusual skill in technical descriptions or in the delineation of character and motives. In the literature of the past as well as of the modern era are found many fine examples of clinical descriptions. Diseases and symptoms have been depicted so accurately as to excite wonder, yet the writers would have laughed to scorn any hint of a medical viewpoint, to say nothing of actual training. Physic and the drama are not mutually antagonistic. Far from it.

Imprimis, Goldoni was not catapulted with a diploma from the defunct type of medical school in which students were invalidated with chronic logorrhea and ideconstipation. He happened to possess keen intelligence, insight and penetrating acumen unrelated to the magical effects of curricula and bulky lecture notes. His father, having met Lancisi, physician-extraordinary to Pope Clement the Eleventh, and being urged to study medicine, accepted the favor and protection of the learned medico to become *Medicinae Doctor*. We learn that his venture was felicitous, for he managed to shun those diseases with which he was unacquainted, and he cured his patients. So Charles Goldoni, following in his father's footsteps, was destined for medicine. Of his apprenticeship we have the assurance that the work was both irksome and noisome, what with examining sundry excrements and the like.

* From the Department of Medicine, University of California Medical School.

As a medical fiasco he is hereby awarded the degree of Doctor of Letters.

What has been said of the medical side might be applied with equal force to Goldoni's training in law. Here, however, he had in addition to a distinct flair, an extensive experience by comparison. A discussion in the family has been known on more than one occasion to launch a son upon a career far removed from the dreams of fond parents. Discontent with medicine and a melancholic strain aggravated by his natural hypochondria soon gave rise to a state that did not pass unobserved by his parents. It was decided to make jurisprudence the vocation of young Goldoni. In Pavia, where he was to accept the tutelage of the university law professor, the prospective student found ample means for literary excursions. These diversions revealed to him the sad fact that Italy as a nation had no theater. Like Ramon y Cajal, the scientist of recent times who created the glory of Spain in medicine, Goldoni, by a similar urge, had vowed to attempt the creation of Italian drama. Needless to say, the career of barrister was not to occupy him for long. In isolated instances one may note a definite reference to his career at law and an objective representation of it which is purposeful. The "Prudent Man," he tells us, is a portrayal of his old profession of criminal lawyer in Tuscany, while the "Venetian Advocate" recalls Goldoni as the civil practitioner in Venice.

Perhaps this Charles Goldoni will not appear so enigmatic in the light of present-day pseudoscientific jargon which babbles of suppressed desires, the subconscious, the libido, urgings and yearnings. For was he not born of a mother who suffered little during her travail, loving him inordinately on this account, and did he not enter this world without the usual baby's wail, a pacifist, in short? An yet, from the very first, his reactions to the opposite sex were clumsy.

One day he found himself at the home

of one of his father's patients, a very young and pretty woman. There was an empty cupboard wanting for wine which the youthful Goldoni thought to supply. His hand was in his pocket, ready to buy, when a knock at the door brought him to his senses and he departed in great haste. Thus he appears to have escaped seduction, but this was not to be his last adventure. At the age of seventeen the urge for the dramatic is strong. So, too, in his quest for literature, an insatiable thirst was not easily quenched. There was an old canon who obliged him by borrowing books and lending to the medical student stolen sweets from the Index Expurgatorius. Thus a copy of Machiavelli's "Mandragora" fell into Goldoni's hands. If we take his word for it, the scandal, intrigue, and lubricity did not fascinate, yet he did read the work ten times over after a devouring first perusal.

From inanimate romanticism Goldoni plunged soon afterward into an amour with a comely servant-maid of Modena. She knew how to let fall a tear from eyes that spoke of friendship and non-reluctance. For a space, a trip to Milan meant deliverance, and here he learned from yet another that a woman of thirty can be displeased with the continence of a gentleman who is contented with her pleasing modesty. The Oedipus complex, to be sure. . . . An infant, born as he was, without whimpering, needs must be attached to his mother. It was quite natural, therefore, that Charles Goldoni yearned for the laying on of maternal hands when, "after having been seduced and deceived," he required to be beloved.

What were the reactions on his part to this love? It was of another sort, he tells us, but until such time as the relish and pleasure of a "respectable and agreeable passion" filled him, he found consolation in a maternal attachment. What psychoanalyst would resist the itch to call this a sublimation of an homosexual trend? The sweet and charming Angelica whom he mentions later he might have married, had there not been so many conflicting self-analyzing and destructive

forces to prevent the consummation. The curious reasoning of our lover will bear examination. She, it appears, was truly the first person whom he had ever loved. She had a sister who, endowed with wondrous beauty, became ugly after the first child was born. Goldoni, by a strange twist, already saw the bloom faded from the delicate beauty of his beloved one. Constantly torn betwixt passion and self-love, he pursued women and interspersed his amours with the writing of plays and the continued pursuit of law. At the age of twenty-five he was admitted to the bar. A few years later, following the perfidy of one Madame Passalacqua, Goldoni met a charming young woman who, to quote him, indemnified him for all of the tricks played by other women, and reconciled him to the fair sex. In short, he seems to have become a husband. Henceforth, he is plunged in work and the number of his farces, comedies and philosophical dramas mounts rapidly.

Of the plays with a strictly medical flavor, the "Dutch Physician" (*Il Medico Olandese*) is preeminently a character sketch. Curiously enough, this comedy was created out of a series of conversations between two hypochondriacs, Goldoni himself and his friend, Duni, a musician, who became acquainted with Boerhaave, the celebrated physician, during several months of treatment at Leyden. The advice of this medical celebrity, while it bore a semblance to the health columns in our present-day journals, proved a boon to the hapless psychoneurotic. He was to lead an ordinary life and to shun all medicines! Henceforth there was praise for Boerhaave, and with the aid of Duni's detailed descriptions of his manners and mode of living, Goldoni evolved the beginnings of a comedy. Boerhaave had a daughter who, though beautiful, young and rich, was yet unmarried. In the play she meets the hypothetical neurotic, Duni, whom her hypothetical father has cured precisely as Duni *veritas* had been before him. A sly twinkle must have played about Goldoni's eye when he

told his friend later that music was less fortunate in Holland than at London and Paris. The "Imaginary Valetudinary" (*Finta Ammolata*) combined gaiety and humor derived from the natural portrayal of neuroses by the principal actress who was too stupid to realize how cleverly Goldoni had taken advantage of her imaginary illnesses.

Of other plays which merit the interest of students of psychology and psychiatry may be enumerated the "Self-Lover or Egotist" (*Amante di se Stesso*), "Solitary Woman" (*La Donna Sola*), "Man of Apathy" (*L'Apatista*), "Cunning Widow" (*Vedova Scaltra*) and the "Capricious Lady" (*Donna Volubile*). The last is an interesting characterization of the type of woman who is in and out of love, transmuting into speech the emotional content of experiences, with the result that she knows not what or how to feel; whose passions are the opposite to her thoughts, and who, in sheer desperation, decides to marry, only to meet with a general rebuff.

A wide experience had taught Goldoni that the "eternal feminine mystery" was a myth and that self-hypnotism played a most important part in the "allure" of women. Witness this bit of judicious comment: "We complain of the women whose graces enchant us, whose charms seduce us, and whose caprices ruin us; but their charms are known, and we ourselves lend them the arms with which they enslave us."

From farce to comedy was for Goldoni a step in advance. He felt that the popular demand for plays free from slapstick and scurrility was complimentary to the public taste. His subsequent works exude piety, chastity, and all of the other virtues extolled by Puritanism. Whether or not he is actuated by a desire to parade restraint as a virtue because he is himself sacrosanct, cannot be determined. One is inclined to feel that Goldoni is really virtuous or else that he is a pathological liar. His exploits and experiences in the emotional sphere smack of frustrated dreams at daybreak.

A play which brought Goldoni into contact with Jean Jacques Rousseau, one of the most interesting pathological characters known, was "The Surly Benefactor" (*Bourru Bienfaisant*), produced in Paris in 1771. It was hardly more than a contact, since the philosopher's bristles did not invite closer communion. In this comedy the leading character combined the virtue of beneficence with more than a goodly share of boorishness and outspoken roughness. The play was altogether so successful that Goldoni's enemies found it necessary to vent their spleen by taunting the foreigner who dared write a French comedy! It was of such critics, perhaps, that Voltaire spoke in likening them to the gnats which deposit eggs in the nostrils of the finest horses, without, however, retarding their speed. In the so-called true "Confessions" of the citizen of Geneva, no mention is made of an episode to which the "Surly Benefactor" gave rise. The following incident may throw some light on the omission. Goldoni, having sought the opinion of Rousseau regarding the comedy in question, promised to show him the manuscript. It appears that in the meantime, another French author had been reading some character sketches to Rousseau who at once saw himself caricatured in the portrait, flew into a rage, and caused friendship to cease there and then. Goldoni, thus forewarned, decided that it were better to avoid Rousseau's appropriation of the beneficence of the "Surly Benefactor." Besides, there was nothing to be gained by brushing against a porcupine. Whereupon the play and its author continued to prosper without occasioning any further ill humor.

The clinical eye of Goldoni has given us numerous interesting references to things medical. Goiter was not unknown at the time and a description of the classical type, now so rare, occurs in an allusion to the wife of an acquaintance. For she had a "monstrous goiter which descended from her chin to her breast." Although these ornaments were by no means rare at Milan and Bergamo, it appeared that Madame

had an "altogether particular kind with a small family of little goiters around it." The appalling nature of this affliction may be imagined when we are told that among young women of the time none was found who would exchange smallpox scars for a Milanese goiter.

Quackery of the day did not escape Goldoni when he described a type of medical mountebank known in our own times. This character, a certain Anonymous, a native of Parma, was Bonafede Vitali, a Jesuit, who, subsequently applying himself to medicine, obtained a professorship in the University of Palermo. He quitted this post to become a vendor of medicines and oratory. Publicly he answered all of the most difficult questions in every science. Nothing was too abstruse or inscrutable for him. During an epidemic in Verona he cured everybody with a sort of apple and Cyprus wine. Attracted to the mountebank for literary reasons, Goldoni wished to make his acquaintance and, under the pretext of buying his antidote, called on him. The quack scented something, apparently, for after eliciting a history respecting the patient's alleged disease, he prescribed a good cup of chocolate as treatment for the patient's curiosity.

The later years of Goldoni's life contain more frequent references to his personal ailments. In describing these infirmities, he reflects the ancient idea of body humors. Attacks of spleen were "as much of a physical as a moral nature," and sometimes his imagination was heated by the effervescence of the body fluids, while at times apprehension deranged his bodily economy. The relation of mental states to physical disability is summed up brilliantly in one sentence: "Our mind is so intimately connected with our body, that if it were not for reason, which belongs to the immortal soul, we should be mere machines." All of his lifetime Goldoni seems to have suffered from ridiculous apprehensions when in good health, while during actual danger he possessed ample

courage. The recourse to exercise and amusement as a cure for neurasthenia is still considered good medical practice. A family physician had advised him to consider an ailment "in the light of a child who comes forward to attack you with a drawn sword, and if you be on your guard, cannot hurt you; but if you lay open your breast to him, the child will kill you." This is not the ancestral shade of Mary Baker Eddy speaking.

Other singularities to which Goldoni was heir are of interest. He gives the reader no clue as to the diagnosis which may be guessed from the vivid clinical description. "I dread heat in winter, and cold in summer—I must have screens to secure me from the fire and an open window in the evening gives me a cold during the most violent heats." He suffered habitually from violent palpitation. This was not periodical, but attacked him at all seasons, several times during the year, when fasting, when at dinner, sometimes after dinner, and rarely during the night. The symptoms did not come on unheralded, for their approach, he tells us, was preceded by a commotion in the bowels, a rising pulse and alarming violence of its beat, a convulsion of the muscles, and a sense of oppression in his chest. Subsidence of an attack was foretold by the return of his pulse to normal. These spells were described as a sort of swooning. It appears that the infirmity was more alarming than painful and Goldoni learned to bear it fearlessly by concentrating his attention on something else. At one time such an attack lasted thirty-six hours, and only then did he have recourse to a physician. One M. Guilbert de Preval, Regent of the College of Physicians of Paris, stopped the attack instantly and retarded future attacks which were always of shorter duration. What the remedy was, is left unsaid, but for the fact that it did not derange Goldoni's system.

In his late years, Goldoni was quite

well but required precautions for his health and strength. These he derived from attentive readings in a "Treatise on Old Age" by M. Robert, who was doctor-regent of the Paris faculty. Goldoni deplored the fact that physicians "take care of us when we are unwell, and endeavor to cure us, but they do not embarrass themselves with our regimen when we are in good health." Robert's work made a deeper impression upon him than Louis Cornaro's "Art of Living Long," in which, seemingly, Cornaro "lived one hundred years as a valetudinary that he might die in good health."

At the age of eighty, to which Goldoni has limited his Memoirs, he says that he reads but little, and "only amusing books." He converses with his wife till midnight. There are times when sleep will not come readily to a troubled head. His cure for insomnia is a veritable gem for efficacy and the explanation of its workings might be the envy of any great psychologist.

O Sleep, O gentle Sleep!
Nature's soft nurse, how have I frighted thee,
That thou no more wilt weigh my eyelids down,
And steep the senses in forgetfulness?"

Thus Henry the Fourth, as he paced the royal bedroom floor in a dramatic monologue. Not so Goldoni. He had already discovered the soporific effect of dictionary-making, and when mental agitation left him staring into darkness at night, he translated in alphabetical array words from his native language into Tuscan and French. "A painful idea," he says, "requires that it be replaced by an opposite or indifferent idea; and the agitation of the mind once calmed, the senses become tranquil, and are deadened by sleep." This method has never failed him. With his wife he sleeps "conjugally in the same bed in winter and in two beds in the same room in summer," expediently. And here let us draw the canopy.



[From Crooke: A Description of the Body of Man. London, 1631.]

EDITORIALS

BENJAMIN WATERHOUSE, AMERICAN PIONEER

Under the above title, Dr. J. W. Courtney of Boston read a most interesting paper on the pioneer of vaccination for smallpox in Massachusetts before the Fifth International Congress of the History of Medicine at its meeting in 1925. In it he describes the trials and vicissitudes which as usual in such cases beset the man who had courage to introduce a new benefit to his fellow beings, and after living to an advanced age had the mortification to be shoved aside and ousted from the institution in which he had taught for twenty-nine years because he had become "an obstructionist and all-round pest." His name would have passed into oblivion except for the great service which he rendered by his persistence in placing the benefits to be derived from Jenner's great discovery before his fellow-countrymen, services which met with no adequate pecuniary reward and brought upon him much obliquy and abuse at the time they were performed.

Benjamin Waterhouse was born at Newport, Rhode Island, March 4, 1754. His mother, Hannah Proud, was a niece of John Fothergill, the famous Quaker physician of London, who did so much for early medicine in this country by his gifts to the Pennsylvania Hospital of books and models to be used for medical teaching. Young Waterhouse began the study of medicine under Dr. John Haliburton of Newport, but in 1775 went to England and pursued his studies in London, where he lived with Dr. Fothergill.

Waterhouse spent six years abroad, going from London to Edinburgh and thence to Leiden, where he took his medical degree in

1780, but remained another year doing post-graduate work. In 1783 he was appointed professor of the theory and practice of medicine in the Harvard Medical School.

In 1799, Dr. John Coakley Lettsom, of London, sent Waterhouse a copy of Jenner's "Inquiry into the Causes and Effects of the Variolae Vaccinae or Cow-Pock." It made a tremendous impression and he determined to make the merits of Jenner's discovery known at once. As there were no medical journals published in the United States at that time of which he could avail himself, Waterhouse wrote an account of Jenner's work which he published in the *Columbia Sentinel*, a Boston newspaper, on March 12, 1799, and shortly afterwards at a meeting of the American Academy of Arts and Sciences held at Harvard and presided over by John Adams, he exhibited Jenner's book and expatiated on the advantages to be derived from his discovery. Although Waterhouse continued to speak and write on the subject he was unable to put it to a practical test until July, 1800, when he received some vaccine virus from London and performed the first successful vaccination ever done in this country on his own son. About the same time Dr. Crawford, of Baltimore, had also received some vaccine virus but his attempts at vaccination with it had proved unsuccessful. After this initial success Waterhouse proceeded to vaccinate many persons and to preach his new gospel with renewed energy. Thomas Jefferson, who had succeeded John Adams in the presidency, having manifested some interest in the subject, Waterhouse sent him some virus, with all the available literature on the subject. Through Jefferson's

efforts upwards of two hundred persons were successfully vaccinated and the practice thus introduced into the southern states. In his own community he met with considerable opposition. The Massachusetts Medical Society showed great reluctance to aid his crusade in any way, as did the Boston health authorities. It was not until 1802 that a committee was appointed to investigate his assertions. This committee accorded him their complete approval after carefully testing his procedure on a number of cases. In 1809 Waterhouse established a "Kine-Pock Institution" in Boston, where vaccine matter "preserved and put up in a peculiar way" was sold, and vaccination performed for a reasonable fee, or on sailors *gratis*. For this and other methods he employed Waterhouse had to undergo the charge of commercialism, due partly to jealousy on the part of his professional colleagues. In 1809 he unsuccessfully petitioned the state legislature for some remuneration for his service to the public. In 1812 he was dropped from the teaching staff at Harvard. Although he continued to practice his profession his practice seems to have fallen away from him.

Oliver Wendell Holmes wrote of him: "A brisk, dapper old gentleman, with hair tied in a ribbon behind and, I think, powdered, marching smartly about with his gold-headed cane, with a look of questioning sagacity and an utterance of oracular gravity. The good people of Cambridge listened to his learned talk when they were well, and sent for one of the other two doctors when they were sick." Waterhouse died October 2, 1846, at the age of ninety-two years and seven months.

Dr. Walter C. Alvarez of San Francisco has recently related in *California and Western Medicine* (May, 1925) his discovery of some hitherto unpublished letters which passed between Waterhouse and Jenner bearing on the former's difficulties. In them Waterhouse refers to Dr. Aspinwall,

who had a smallpox inoculation hospital in Boston and feared that the introduction of vaccination would ruin his business.

On October 20, 1801, he writes:

Aspinwall, whose candor and liberality was all affectation, has shown his teeth this summer and has injured the new inoculation by inoculating those *whom he knew had never gone fairly through the disease*, and advertising the result in the newspapers. It was just his harvest time, it staggered several who were balancing between the S. pox and the kine pox, and occasioned perhaps 20 or 30 to go into hospital. He gives out that the K. pox will preserve from infection for a few months *but no longer*.

Later, however (April 15, 1802), he writes: "I hope Mr. R. will not name Aspinwall in terms that may hurt his feelings. I have many apologies to make for him. There are hundreds worse than he is in the opposition. His hospital is his own property and he will lose 1500 guineas a year by it."

Alvarez points the parallelism between the trouble which Waterhouse experienced with Aspinwall and that which Jenner experienced with Woodville. The latter ran a large smallpox hospital in London and he naturally saw ruin staring him in the face if Jenner's discovery was verified. However, he became convinced of its truth and henceforth was one of Jenner's most active supporters, publishing a book in which he reported the results of his own experiments with the vaccine.

Dr. Waterhouse is one of those sad cases in which a man's temperament and character mar his really good qualities and interfere with his usefulness and happiness. His great services were quite generally recognized elsewhere than in his own community. While he received many honors, degrees, honorary memberships and so forth, from bodies in France, England and elsewhere, his aggressiveness and persistence injured him with his colleagues in Boston.



BOOK REVIEWS

ATLAS OF THE HISTORY OF MEDICINE, ANATOMY.

By Dr. J. G. De Lint, Lecturer on the History of Medicine at the University at Leiden. With foreword by Charles Singer. New York, Paul B. Hoeber, Inc., 1926.

This work marks a new and important development in the study, or rather the teaching, of medical history. Everyone who has attempted to interest students in lectures on the subject has realized how very important an adjuvant lantern slides are in stimulating the student's interest. The works of Sudhoff, Hollander, Singer, Garrison and others have shown what a wealth of such material is available, but as yet no attempt has been made to produce an atlas or pictorial history of medicine such as this with a minimum of text and an abundance of illustrations. Although anatomy naturally lends itself more to illustration than some of the other branches, there is no lack of material which, judiciously used, would not aid greatly in enabling the student to fix in his mind the chief facts in the history of medical science and we hope that the subsequent volumes of this Atlas will fulfil the promise held forth by the first.

Dr. De Lint begins his book with pictures of clay models used for hepatoscopy by the Babylonians and Etruscans and of some Chinese anatomical figures. He then presents figures from manuscripts illustrating the anatomical conceptions which prevailed in the Middle Ages, based chiefly on the works of Galen, following these with pictures of dissections and anatomical figures from Mondino and other early anatomists of the Italian School, and then gives figures from the "Fabrica" of Vesalius and the works of his contemporaries and followers. These pictures and the accompanying text furnish a concise but very complete view of "anatomy in long clothes" from the earliest times to its emergence as a science under the leadership of the great master. As Singer remarks in his Foreword, Dr. De Lint naturally gives prominence to the work of his nation but it is remarkable how much credit is due to the Dutch Anatomists and he certainly could not be

accused of any undue national prejudice for reproducing illustrations from the works of Peter Pauw; Francis de la Boë (the Dutch Sylvius); Jan Van Horne, who first demonstrated the thoracic duct in the human subject; Leeuwenhoek; Swammerdam; Regner de Graaf, the discoverer of the Graafian follicles; Anthony Nuck, who is commemorated in the canal which bears his name; Frederick Ruysch; Nicholas Tulp, who, though best remembered as the leading figure in Rembrandt's "Lesson in Anatomy," was one of the best anatomists of the seventeenth century; Bidloo, from whom the English anatomist Cowper stole the pictures which had been engraved for his "Anatomia Corporis Humani" and published them as his own; Blasius, who gave the first accurate description of the arachnoid membrane; Camper, the first to describe the cartilages now known by the name of the cartilages of Wrisberg; Albinus, author of the most splendid anatomical atlas of the eighteenth century, from which De Lint reproduces several interesting illustrations; Kulm, whose "Tabulae Anatomicae" had the fortune to open the eyes of the Japanese to the falsity of their ideas of anatomy (a Japanese doctor named Mayeno, having dissected a body, compared the anatomy thereof with the plates in Kulm's book and saw at once that the Dutchman was right, with the result that the Tabulae were at once translated into Japanese); and lastly De Vries, the famous investigator of evolution and heredity. Certainly any English or American writer on the history of anatomy could not omit from consideration the work of any of these masters, therefore we can gladly acquit Dr. De Lint of any suspicion of partiality, more especially when we consider that the work of anatomists of every other nation is given its due share of prominence. The anatomical figures are supplemented by portraits and thumbnail biographies of most of the great anatomists. These little notes and the brief legends attached to the other pictures are excellently done. Attention is drawn especially to the facts which bear on

the subject of anatomy and superfluous biographical or personal details are omitted.

The illustrations are most excellently reproduced on good quality paper so that the details can be readily seen. We congratulate the Author on a successful start on an original enterprise.

FRANCIS R. PACKARD.

HISTORY OF MEDICINE, by Dr. Max Neuburger, Professor of Medical History in the University of Vienna. Translated by Ernest Playfair, M.B., M.R.C.P., Vol. II, Part I. London, Humphrey Milford, Oxford University Press, 1925.

Ever since the publication of the English translation of the first volume of Neuburger's "History of Medicine" some fourteen years ago the appearance of its continuation has been eagerly awaited by English and American students of medical history, and we are glad that the publishers have announced their intention to issue the remaining parts "as and when the German original is published." This first part of volume two is fully up to the high standard set by the previous volume and continues the study of medicine in the Middle Ages with the same broad, philosophical view which was such a feature of the Author's history of medicine in more ancient times. A distinctive feature of the work is the skill with which Dr. Neuburger's text presents the subject as a continuous narrative, placing the details in smaller type, adding thereby very greatly to the pleasure of the reader who wishes to *read* and not merely to consult the book for reference.

The present portion deals with what is quite generally regarded as one of the most uninteresting periods in the history of medicine, a time in which it is difficult to find any evidence of scientific progress, the literature generally consisting of dreary scholastic compilations or jejune speculations tinged with astrology and other superstitions. As Neuburger says: "Occidental medical art, which had shown signs of deterioration and decadence even in the later centuries of Imperial Rome, dragged out its existence through more than five hundred years of the Middle Ages before manifesting any tendency towards emancipation from the bondage of this intellectual stagnation; it attained to the dignity of a science only at the later epoch when the pre-eminence of the Arabs had begun to fail."

During this long period the "dim religious light of the Church and the study-lamp of the poring monk were almost the sole illumination." The most notable examples of such illumination in the earlier part of the Middle Ages are afforded by the Benedictine Monastery at Monte Cassino and the intellectual labors of Irish and Anglo-Saxon monks. But the predominance of the clerical influence in scientific matters, while it succeeded in preserving some erudition and in founding some institutions for the care of the sick, exerted a blighting effect on the progress of scientific thought and experiment which retarded further development for many centuries. In the eleventh and twelfth centuries there was a general forward movement in civilization with which there came a coincidental rise of medicine. The School of Salerno stands out as its most conspicuous exponent. Neuburger devotes sympathetic pages to a narration of its brilliant career and a careful analysis of the writings of its teachers: "It was due to the School of Salerno that the healing art of the Christian West once more awoke from its five centuries of lethargy." During the twelfth century many edicts were issued by the Church against medical practice by ecclesiastics. It was felt that priest and monks neglected their proper duties because of the financial rewards from practicing, that it jeopardized their dignity and afforded foundation for scandal, and that many persons were tempted to become clerics in order to open for themselves a career as physicians. Nevertheless the mere fact that a repetition of such edicts was necessary indicates a loathness on the part of the clergy to part with their opportunities to practice as doctors. A particularly important portion of the book deals with Arabic influence on Western medicine and the development of scholasticism, with its train of harmful consequences. Astrology did much at the same time to hamper scientific progress. The good traditions of the Salernitan teachers, inculcating bedside observation and showing considerable originality of thought, were lost in the flood of Arabism and scholasticism. With the rise of the universities in the thirteenth century the horizon brightens, Montpellier, Paris, Bologna and Padua. Men like Roger Bacon, Albertus Magnus and Arnold of Villa Nova by their really scientific methods of thought and work, even though hampered by the prevail-

ing scholasticism and clerical superstition, did much to help medicine emerge from the slough in which it wallowed. Hospitals, leper houses and other institutions of a like kind were founded during the thirteenth century in ever-increasing number and the opportunities for clinical study correspondingly multiplied. At the beginning of the fourteenth century human dissection was once more practiced, after having been practically abandoned for some 1500 years.

In 1316 Mondino de Luzzi published his epoch-making little book on human anatomy, which not only was widely distributed in manuscript editions, but after the discovery of printing went through some twenty-five editions between 1478 and 1580. Surgery had raised its head in the thirteenth century with William of Saliceto and Lanfranchi as its chief exponents. Following them Henri de Mondeville and Guy de Chauliac placed it on a firmer basis. The profession was now fast emancipating itself from the old scholastic fetters. Anatomy and surgery were practical sciences and their development drew men gradually away from mere bookish erudition. The book concludes with a very interesting historical survey of the medical literature of the fourteenth century.

Let us trust that the time may be short before the continuation of this great work will be available. It is a remarkable performance and has been particularly well rendered into English by its translator.

FRANCIS R. PACKARD.

ESSAYS IN THE HISTORY OF MEDICINE BY KARL SUDHOFF, M.D. Translated by various hands and edited by Fielding H. Garrison, M.D. Vol. II of the Library of Medical History. New York, Medical Life Press, 1926.

On the occasion of his wife's birthday in 1921 the most distinguished of modern medical historians presented her with a graceful tribute of affection in the form of a volume of "Sketches" or essays on historical subjects, representing, as Garrison puts it in his Foreword: "the fine flower, the end-results of Sudhoff's massive achievement in the history of medicine." The present volume contains these sketches, a few of the original numbers being replaced, with the Author's consent, by other essays by him better adapted to the American reader. The book opens with a delightful biographical sketch of

Sudhoff by Garrison. Karl Sudhoff was born at Frankfort-on-the-Main, November 26, 1853. After receiving his medical degree at Erlangen in 1875, he worked in Augsburg and Berlin and then went to Vienna for postgraduate work. For thirty years he enjoyed a very large practice, five years in Frankfort, the rest at Dusseldorf, specializing in gynecology. This he gave up in 1905 to accept the chair of Professor of Medical History which had been endowed at the University of Leipzig by the will of the widow of Puschmann, the medical historian. For many years Sudhoff had been profoundly interested in the history of medicine and had acquired a large library on the subject. Medieval medicine and Paracelsus were the topics to which he had devoted most of his energies. He had also been a profound student of Goethe and had written much about him and had originated the Rhineland Jubilee Exposition in his honor in 1899. When he assumed the new professorship Sudhoff insisted that an institute should be established in connection with it, where books and objects of interest bearing on the history of medicine could be collected. He immediately began a long series of journeys to libraries, collections and museums or to localities where material for study might be found. Garrison gives a long list of these fruitful pilgrimages. In 1907 he commenced the publication of his *Archiv für Geschichte der Medizin*. "By the end of 1913, Sudhoff had already published 456 books and papers and nearly 1800 reviews." Then came the World War and Sudhoff at the age of sixty-one became medical officer to a hospital in Leipzig. Throughout the War he continued to edit the *Archiv* and worked unceasingly at his favorite labors. In 1903 Sudhoff celebrated his seventieth birthday and in the following year was retired for age. Garrison devotes a number of pages to a searching analysis of Sudhoff's scientific work and methods of teaching. This biographic sketch should be read by all those who are interested in the study of its subject's writings. The names of the "various hands" who have translated the "Skizzen" are a sufficient guarantee of the high standard of the work. They are Albert Allemann, Fielding H. Garrison, John C. Hemmeter, Edward B. Krumbhaar, Felix Neumann, George Panebaker, Herman T. Radin, Emilie Recht, David Riesman, John Ruhräh, Major G. Seelig and Frank J. Stock-

man. Unfortunately lack of space prevents an adequate consideration of each of the 38 articles which are here presented. It goes without saying that everything which Sudhoff has put forth on medical history is worthy of careful study and these "Skizzen" are a bouquet composed of many beautiful flowers from the main stem. They represent most of the leading topics on which many laborious years have been spent by the author. Although some of them occupy but a few pages they are all full of charm and interest. If we were required to direct attention to a few of them we should choose the following as of the greatest general interest and a mere recital of their titles will suffice to show the reader what a rare treat he has in store for him: Periods in the Development of Medical Science; Schools of Physicians; Medicine in the Stone Age; Salerno: a Medieval Health Resort and Medical School on the Tyrrhenian Sea; The Origin of Syphilis. The articles on Goethe possess a great appeal to those who are interested in one of the greatest scientific and literary figures of German history. The book is a most valuable contribution to the history of medicine and the profession is indebted to its Editor and Publisher for the successful performance of their enterprise.

FRANCIS R. PACKARD.

JOANNES BAPTISTA CANANO, 1515-1578; GIROLAMO DA CARPI, 1501-1556; MUSCULORUM HUMANI CORPORIS PICTURATA DISSECTION (FERRARA, 1541). Facsimile edition annotated by Harvey Cushing and Edward C. Streeter. MONUMENTA MEDICA under the general editorship of Henry E. Sigerist. Vol. iv. Florence, R. Lier and Co., 1925.

This delightful addition to the invaluable series of "Monumenta Medica" throws the most interesting light on the history of anatomy during the time of Vesalius, not only by the text of the little classic which forms its nucleus but by the additional material provided by the editors, Cushing and Streeter, two of the most profound contemporary students of the epoch. In his Introduction Dr. Cushing classes this book by Canano along with the six anatomical tables of Vesalius and the "Restitutio Christianismi" of Servetus as *libri inter rariores longe rarissimi*. The anatomical plates of Vesalius were thumbed out of existence, only two complete sets and a fragment still existing as far as is known. The book of Servetus containing the account of his discovery of the pulmonary

circulation was ordered burnt by the hangman along with its author by the narrowminded bigotry of John Calvin. Of it also there apparently survive but two complete copies and a fragment. Of Canano's book there are but few copies left, because the Author himself tried to suppress the first and only part ever published shortly after it had been printed. How he came to perform such a literary infanticide is delightfully told by Dr. Streeter in his Biographical Notice of Canano.

Giambattista Canano was born in 1515 at Ferrara. He came of professional stock, of eight members of the Canano family who figure on the roster of lecturers at the University of Ferrara, five were physicians. Giambattista's paternal grandfather, who bore the same Christian name, had been physician to Matthew Corvinus and was, like his royal master, a great book collector. At his death his library was divided between his two sons, the father and uncle of young Giambattista. This uncle, Hippolito Canano, was a professor in the medical faculty at Ferrara and probably directed his nephew's studies, but it was to his cousin Antonio Maria Canano that he owed his initiation in the newer methods of anatomical study. Antonio had been a pupil of Marc Antonio dalla Torre at Padua. The two young men used to dissect human bodies in a room in the house of Giambattista, associating with them a younger brother of Vesalius named Francis, Jacopo Antonio Buoni, Arcangelo Piccolomini and others interested in the new anatomy. Giambattista was familiar with the writings of all the old masters of medicine which were contained in the library bequeathed by his grandfather but he was not the man to bow before the Galenic traditions. In 1541 Antonio Maria Canano resigned the chair of anatomy in the University and Giambattista, then but twenty-six years old, succeeded him. Streeter suggests that: "It looks like an allowable case of nepotism" as Antonio was not an old man and continued working at anatomy after his resignation. "Over and around Giambattista all his days, is seen this circumambient play of affection. The warm esteem, the ever-deepening regard in which he was held and surrounded are merely the reflux waves of affection which had origin in the heat at the center of the man himself." From contemporary testimony we learn on all sides of his geniality, honesty,

industry and great sense of humor. Shortly after becoming professor of anatomy Canano began the issue in parts of a work on anatomy. The first fasciculus probably came off the press in the summer of 1542. "With a modicum of text, a model of compressed statement, with a brilliant series of twenty-seven illustrations and some dedicatory matter, Canano made a partial revelation of his power." The work anticipated Vesalius in the accuracy with which it delineated the muscles and bones of the upper arm and forearm. In the preface he stated that five of the remaining books were in press. Suddenly he decided to stop publication and suppress the part which had already appeared. Streeter attributes this action to the visit which Vesalius paid to Ferrara sometime between the middle of August and the first of November, 1542. He believes that Vesalius had with him the trial-proofs of his wood-cut illustrations for the "Fabrica" which he was taking from Padua to Bâle to the printer Oporinus and that Canano saw that his work was so completely outdone by the other that he determined to withdraw from the field, "thus doing first homage to Vesalius." A few copies of the first fasciculus had passed out of his hands and among these precious rarities was the copy given by him to his friend Antonio Buoni, from which the present facsimile has been made. Streeter continues the narrative of Canano's career until his death. In 1543 he entertained Dr. John Caius, the famous English physician, who many years later wrote in praise of Canano's library. He continued to lecture on anatomy at Ferrara and in 1548 he communicated his discovery of the palmaris brevis muscle to Fallopius. It is certain that he also discovered the valves in the veins but as he made no written announcement of his discovery the credit for it has frequently been given to others. Streeter quotes the statement of Vesalius that Canano has told him of the existence of valves in the veins when they had met in consultation in 1546. As Streeter says: "Had Vesalius verified, and treated in a generous and ampliative manner, the findings of Canano, and given them due weight in his edition of the 'Fabrica' of 1555, the world would not have waited until 1628 for a Harvey." The claims of Canano were fully stated and justified by Fallopius in subsequent years, yet the discovery lapsed from men's minds until in 1574 Fabricius

at Aquapendente proclaimed his finding them as a "discovery." In 1552 Pope Julius III appointed Canano archiater or Palatine physician and bishop of Ficarolo. After the death of the Pope in 1555, Canano returned to Ferrara. He received the appointment of protomedicus to the Dukedom of Este and from thenceforth busied himself in this position, practically that of public health officer. Canano died on January 29, 1579.

This volume is one of the most important of the invaluable series of the "Monumenta Medica," not only for the rarity of the original but for the light thrown by it and its Editors on the early history of the renaissance of anatomy in Italy.

FRANCIS R. PACKARD.

REMINISCENCES. By George Henry Fox, M.A., M.D.
New York, Medical Life Press, 1926.

Dr. Fox, one of the most distinguished of American dermatologists, has compiled in this little book a series of memories of events and persons which although primarily intended as a sort of family record contain much of interest to the general reader. Born at Ballston Spa, New York, 1844, of a long line of New England forebears, Dr. Fox shows that no less than eighteen descendants of Thomas Fox of Concord became physicians. He himself received his degree of M.D. from the University of Pennsylvania in 1869. The faculty at that time included some of the most distinguished teachers in America, Leidy, Alfred Stille, Francis Gurney Smith, Henry Horner Smith, Joseph Carsen and R. A. F. Penrose.

Fox relates an episode which occurred during his internship at the Philadelphia Hospital (Blockley) which illustrates the sharp change from those days to the present. A few women students used to slip in to the public clinics where they met a chilly reception from the clinical lecturers and internes. The women used to come early and thereby secure front seats. One day during a surgical operation the supply of threaded needles ran short. The two male internes with bloody fingers tried in vain to thread an extra needle. The surgeon, out of patience exclaimed: "Give it to one of the women!" The interne passed the needle and thread to one of the female students who deftly threaded the needle and handed it back, amidst the applause of the class.

After leaving Blockley Dr. Fox travelled for some time in Europe, finally settling down in Vienna for serious postgraduate work under the wonderful group of men which then made that city famous as a medical center. Fox seems to have been particularly impressed by the teaching and personality of Hebra. Returning to the United States, Dr. Fox married in 1872 and immediately sailed for France to resume his dermatological studies in Paris and London. Returning he began practice in New York and the reader will find many interesting pen pictures of the prominent men of the profession and of medical life in that city during the subsequent half century. As Professor of Dermatology in the College of Physicians and Surgeons for a quarter of a century Dr. Fox came in contact with more than three thousand students, many of whom obtained professional eminence in later years. Dr. Fox held many positions of honor in various medical societies and this gave him a wide circle of professional acquaintances. He contributed much to periodical medical literature and is the author of several standard works on dermatology. In the last chapter he gives a resumé of some of the changes in social and economic conditions of which he has been the witness. In his well earned repose after years of arduous labors he has compiled a little book which expresses in every line a cheerful philosophy.

FRANCIS R. PACKARD.

A DOCTOR'S MEMOIRS. By Victor C. Vaughan. Indianapolis, Bobbs-Merrill Company, 1926.

Dr. Vaughan begins his book with the recollections of a boyhood passed on a farm in the backwoods of Missouri. He was about ten years old when the outbreak of the Civil War caused Missouri as a border state to suffer even more than is usually the case the horrors of war among neighbors, and the Vaughan family received its full meed of the troubles incident to such an event. Dr. Vaughan's relation of this part of his life furnishes a most interesting picture of a phase of American history which is very inadequately known and accounts of which are too generally so colored by prejudice and exaggeration as to be valueless, objections which cannot be offered against our author's plain, unvarnished tale.

In the first chapter the account of his ancestry, mixed Huguenot and Welsh, his French forefathers having been expelled from France

by the revocation of the Edict of Nantes in 1685, shows that he came of stock that was not easily daunted, and this is clearly proved by the way in which the Vaughans managed to "carry-on" through all the troubles of the Civil War and emerge triumphant. After graduating from Mount Pleasant College in 1872, Vaughan taught in that College and at Hardin College before entering the University of Michigan, the institution with which he was to be so closely associated in subsequent years, from which he received the degree of master of science in 1875, and in the next year was appointed instructor in physiological chemistry, delivering his first lecture in January, 1876 and continuing to teach classes in the University until he delivered his last lecture to them in June, 1921. In 1891 Dr. Vaughan was chosen Dean of the Medical Faculty of the University of Michigan and remained in that position for thirty years. He was one of the chief factors in building up the great medical school which flourishes at Ann Arbor today. His reminiscences of the old faculty when he first joined it and of the men who have subsequently held the chairs are a valuable contribution to medical history. Many of those who were students or fellow teachers with Vaughan passed to the highest professional positions obtainable in this country and with due modesty as to his own part Vaughan shows with what just pride he can recall the part played by his Alma Mater in the progress of medical science in this country. In his references to his colleagues and to the profession at large Vaughan, though always just, speaks with much candor. Although from 1878 until 1898 Vaughan practiced medicine successfully, his chief activities lay in his work in the medical schools and as an expert in cases of criminal poisoning or in giving advice to communities in which disease was epidemic.

At the outbreak of the Spanish-American War Dr. Vaughan volunteered and was sent to Cuba with General Duffield's brigade which participated in the battle of Santiago. In this engagement Dr. Vaughan won a citation for "gallantry on the field of battle." Afterwards, while encamped at Siboney, Vaughan shared in the sufferings resulting from the blunders of those responsible for the organization of the expedition, undergoing a severe attack of yellow fever in his own person. On returning to New York he was ordered to act on the Typhoid

Commission appointed owing to the prevalence of the disease in the hospitals and camps. The other members of the Commission were Major Walter Reed, U. S. A. and Major E. O. Shakespeare, the latter like Vaughan an epidemiologist appointed to the army from civilian life. Those who were not brought in contact with the conditions as they existed can hardly at this day realize the terrible confusion and ignorance which prevailed throughout the Army in regard to the diagnosis and management of typhoid fever in 1898. The diagnosis between typhoid and malaria was in the majority of instances so carelessly made that the hospital returns made before the Commission was operating are practically entirely worthless. As Vaughan states, there was not a microscope in any of the camps and an Army diagnostic laboratory had never been thought of. Surgeon-General Sternberg at once adopted the first recommendation of the Commission, which provided for the establishment of such laboratories and the most expert laboratory men that could be obtained were put in charge of them. Vaughan tells how in a short time efficient laboratory methods had established the fact that the vast majority of cases reputed as malaria or typhomalaria were typhoid. The very name or misnomer, typhomalaria, which had prevailed since the Civil War passed into deserved oblivion. Shakespeare died before the report was completed but Vaughan labored on till he had completed the monumental work which did so much to aid in the correct understanding of one of the greatest of the epidemic scourges.

When the Great War came Dr. Vaughan again hastened to serve his country. One of the early members of the National Research Council, he was active in its affairs until commissioned a major in the army and assigned to duty with the medical division of the Council of National Defense in Washington. It might be stated that his five sons were also all commissioned officers during the War. The chapter on the World War is well worth careful reading because of the light it throws on certain war activities, well meant but somewhat hysterical, or misdirected energies evolved during the height of the struggle; among these Vaughan groups national prohibition and the so-called "Intelligence Test" as used in the promotion of Officers. As would be expected Dr. Vaughan

has been brought in contact with many of the prominent men of his day and he gives many lively thumbnail sketches of them.

FRANCIS R. PACKARD.

A MEDICAL ART CALENDAR FOR THE YEAR 1927. Published by J. Philip Kruseman, The Hague, Holland.

This is one of the most delightfully appropriate and artistic productions of its kind, and most original in its conception. In the Foreword it is explained that this is the ninth year of the venture, which is unfortunately very little known of in this country. With the aid of an advisory committee which Drs. A. Sikkels, G. de Lint, J. B. F. Van Gils, G. H. Bisseling and Corn. Hofstede De Groot, the Publisher has assembled twelve most excellent reproductions of pictures of interest to the profession, one for each month. Beside each picture is a legend, printed in Dutch, English and French, which states its name, and that of the painter, and the museum or book from which it was copied. The whole calendar is most beautiful. It might be stated that this calendar is not made by the Publisher for advertising. It is a very delightful medium of conveying Christmas wishes which we are told by a Dutch Friend has been growing in popularity with the medical profession in Holland since its first appearance.

FRANCIS R. PACKARD.

THE DOCTOR LOOKS AT LOVE AND LIFE. By Joseph Collins. New York, George H. Doran Co., 1926.

It is always of interest to watch a man who has been successful in one profession step into another and attain success there as well. No doubt the contemporaries of Dr. Collins in the medical profession thirty years ago watched his development as a neurologist as we observe his growth as a writer. The process is particularly interesting to the members of the medical profession, among whom there are few who have the power to write with distinction. A writer should bring all his knowledge to bear in discussing a problem and few writers have a better opportunity to gain an accurate first-hand knowledge of human nature with its twists and peculiarities than a physician and among the latter undoubtedly we should single out the neurologist.

The first portion of this book deals with the subject of love and sex and if anyone is inclined

to criticise the method of discussion he should first ponder over the question as to how he could have discussed the subject. Doubtless some will say that certain phases of the subject should be confined to books for the medical profession but probably the author feels that, properly presented, no one is the worse for knowing the truth. The results of ignorance of the facts of life and reproduction are set out in a convincing way. Education should lead to improvement as it has in lessening the ills of tuberculosis.

In the second part, in which the author deals with other aspects of life, he is on happier ground for himself, so the reviewer judges, and he studies some of the tendencies of these days in a most entertaining and instructive fashion. "Adult Infantilism" is the title of one chapter and would that its message could be conveyed to every adult in the country. Many of them could not understand it but teachers might be found. As he says: "The adult infant is not

aware of his handicap" and we fear that he never will be made aware. The part that emotion, and childish emotion at that, plays in the national life is set forth convincingly. For the individual example, the late William Jennings Bryan is chosen and one cannot quarrel with the selection. The examples from literature are many, with perhaps the study of Olive Schreiner as the most illuminating of all. The chapter on "The Fundamentalists and Modernists of Psychology" has much to say of Freud and it will not be pleasing to those who call themselves Freudians.

This book should appeal to thinking persons. You may find opinions with which to disagree but your mind will be stimulated and some hard thinking should result. That will not do harm to any of us. We hope the message regarding adult infantilism will reach some of those whom it might benefit, but we fear that the majority are joined to their idols. THOMAS McCRAE.



ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

CONTENTS OF VOLUME FIVE

BROWN, Anatomical Habitat of the Soul; VIKTA, Eponymic History of the Ganglion Semilunare (Gasser); DOWLEY, Riolan and Harvey; MIDDLETON, William Edmonds Horner; FISHER, Incunabula: Library of the College of Physicians; SANDS, Review of an Early Paper on Malaria; MAXWELL, "Ta Sheng P'ien," a Chinese Household Manual of Obstetrics; MIDDLETON, Joseph Leidy; KERR and PLEADWELL, Lewis Heerzhuud; LLOYD, Dr. John Meems and His Title; CUMSTON, Overlooked Painting of Saint Roche; CHARLTON, Medicine in Lower Canada; CAUMMER, Anatomical Fugitive Sheets;

BAXLEY, William Hewson; PACKARD, Earlier Methods in the Treatment of Syphilis; VILLASOAS, Primitive Medicine in the Philippines; RIDDLELL, Hydrophobia: Four Centuries Ago; MENDELSON, Malmorden; RISEMAN, A Physician in the Papal Chair; ROCHAMBEAU, Richard Bright; GUYER, Oskar, Student of the Toronto School of Medicine; COURTNEY, Mollire and the Faculty; PLEADWELL, Edward Cutbush; ELKIN, Transylvania School and Oliver Perry Hill; KORRO, Three Medical Pioneers in Norway.

CONTENTS OF VOLUME SIX

COURTNEY, The Multiple Personality of Patin; LARSELL, Anders Adolf Retzius; BROWN, De Venenis of Petrus Abbot; KALLAND, Outline of the History of Medicine from Its Earliest Days to 600 A.D.; STEINER, Conflict of Medicine with Quackery; KERR, Elieha Kent Kane; CORIAT, Symbolism of the Gold-Headed Cad; Incunabula: Library of the Medical Society of the County of Kings, Brooklyn; Library of the Pennsylvania Hospital, Philadelphia; Library of the School of Medicine of Washington University, St. Louis; CRANON, Sir William Bowman; JOHN, Surgical Clinic of Charles University, Prague, 100 Years Ago; MORRISON, Carl Welger; BURDET, Lazzaro Spallanzani; TOOMEY, Sir William Butts, Physician of Henry VIII Mentioned by Shakespeare; RUHRAE, James Adkinson and His Medical Bibliography; CHARLTON, Medicine in Lower Canada; PLEAD-

WELL, Elieha North and His Treatise on Spotted Fever; DAWSON, Semmelweis; DAVIS, Neglected Evidence in the History of Phlegmaton, Observations on the Doctrine of Forms and History of Alchemy; MOSCOWITZ, Unpublished Letter of St. Thomas Brown; CAVARRIA and SMILEY, First Known Post-Mortem Examination in the New World; COURTNEY, Gabriel Naude; MOSCOWITZ, First Editions of St. Thomas Brown; EAST, Samuel Thomas von Sömmerring; KERR, William Maxwell Wood; MIDDLETON, Biographic History of Physical Diagnosis; VAN ANDER, Ceraunis or Thunder Axe; CORIAT, Rabeleis the Physician; CUMSTON, Notes on Smallpox and Inoculation; ROBERTSON, "The Breviary of Health" by Andrew Boorde; DARA, The Sequins of New York.

CONTENTS OF VOLUME SEVEN

CAUMMER, Anatomical Fugitive Sheets; MILLER, James Mease; DRINKER, Doctor Smollett; GOODMAN, Master Dermatologists; DAWSON, Su Wen, the Basis of Chinese Medicine; RUHRAE, William Cadogan; CHEN, Chinese Drug Stores; BURGESS, Stephen Halse; WRIGHT, Medical Essay on the Tonsils; KORRO, Gerhard Henrik Atmanet Hansen; KRUMHAAK, Experimental Cancer; BRAGMAN, Maimonides on "Physical Hygiene"; BALL, Samuel Thomson; PACKARD, Selections from Gibbon's "Rambles in Europe"; RISEMAN, Thomas Sydenham; RANDALL, Curiosities from the Collection of

Calcutt; ROLLESTON, Caleb Hillier Faby; ROBERTSON, Digby's Receipts; D'IRRAY, Black Death and the Medieval Universities; ALLYN, Black Death; GIBSON, Thomas Dent Mutton; HATMAN, Malpighi's "Concerning the Structure of the Kidneys"; BALL, Ether Tragedies; TAYLOR, Crawford Williamson Long; HUME, Petruskof's Theory of the Etiology of Cholera; WILLIAMSON, Sir Dominic Corrigan; D'IRRAY, Gilles de Corbeil; MENNA, Carl Rokitsansky; ROBERTSON, Powder of Sympathy; BRAGMAN, Medical Wisdom of Mark Twain; GARRISON, Poem in Praise of Ophthalmologists.

CONTENTS OF VOLUME EIGHT

ROLLESTON, Poetry and Physics; RAAD, Old Chinese Medicine; HOWELL, Workers in the Cause of Anatomy 100 Years Ago; ELOESSER, Pirate and Buccaneer Doctors; MALLOCH, Galen; MOODIE, Studies in Paleopathology XIV-XIX; EAST, Adolf Krummash; GARRISON, Medical Numismatics; GIBSON, Samuel D. Gross; DILLER, Pioneer Medicine in Western Pennsylvania; HOWELL, Some Old Medical Journals; WALSH, Galen and the Recurrent Laryngeal Nerve; CHEN and LING, Chinese Medical History; MIN, China's Contribution to Medicine in the Past; MIDDLETON, John Redman; BRUCE, Operative

Story of the Heart; D'IRRAY, Teachers and Textbooks in the Medieval University of Paris; ROBERTSON, Unicorn's Horn, Coral and Stones; OWEN, Roger's Plague and Papyrus; LLOYD, De Mandeville and His Fable of the Bees; CHANCE, Sir William Lawrence; CUMSTON, Herpes; ROLLESTON, Worthies of the Cambridge Medical School; COLA, Francesco Redi; KRUMHAAK, Medals and Tokens; FOX, Microscopical Preparations from Original Tissue Described by Hodgkin; MILLER, Abraham Chevet; WILK, Asclepius, the Thales and the Theater; WOOD, Ayurvedic Medicine in Ceylon.

Published by PAUL B. HOEBER, INC., 76 FIFTH AVENUE, NEW YORK, N. Y.



2 set set
VOLUME IX, NO. 3

SEPTEMBER

1927

ANNALS OF MEDICAL HISTORY



FRANCIS R. PACKARD, M.D., EDITOR (PHILADELPHIA)
PUBLISHED QUARTERLY BY PAUL B. HOEBER, INC.
SEVENTY-SIX FIFTH AVENUE, NEW YORK, N.Y.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

CONTENTS OF VOLUME ONE

SWIGER, *Girolamo Fracastoro*; GARRISON, *Greek Cult of the Dead and Christian Deities*; CORREA, *Three Characters of a Physician*; BAILEY, *Voltaire's Relation to Medicine*; STRANDBERG, *Unpublished Brown Ecce Homo*; BURR, *Burke and Hare, the Psychology of Murder*; SVETAK, *Hebrew Prayers for the Sick*; FERNBERG, *Colonial Laryngology and Otolaryngology*; JACOBI, *Eulogy of Dr. John Shaw Billings*; SUNDORF, *The Hygienic Idea in World History*; VINTS, *Paternal Festival for Thomas Willis with Remarks by Osler*; SUTTER, *Medicine and Mathematics in the 16th Century*; ROY, *Development of Our Knowledge of the Circulation*; ALTMANN, *James of the Old Paris Academy*; KLEBS, *History of Infection*; SHIPPEN, *Draft of a Plan*

for the Military Hospital; BOWEN, *Beginnings of Intervention in Lascivious*; OWEN, *Legislative and Administrative History of the Medical Department of the U. S. Army*; DEVOYER, *General Skeletal and Visceral Anatomy in the Book of Henry Jones*; BABYLONIAN-ASSYRIAN MEDICINE; SWIGER, *Greek Charm Used in Ireland in the 12th Century*; HIRSMANN, *Military Sanitation in the 16th-18th Centuries*; Medical Iconoclasm; SARGENT-GOULD; G. LEVY, *Osler, First Printed Documents Relating to American Surgery*; Byzantine Medical Fragments; JACOBI, *N. Y. Medical College*; MOORE, *Studies in Paleopathology*; SWIGER and LEVY, *Post Traumatic*; ROYTER, *Medical Phrases of Victor Hugo*.

CONTENTS OF VOLUME TWO

CORRIE, *Anatomies in Search of the Soul*; JAVIER, *Medical Gods of Italy*; WARREN, *"Pulmotor" of the 18th Century*; McCULLOCH, *Conspicuous*; GARRISON, *Birthplace of the Hunter*; WALSH, *Laryngology and Rhinology*; McCULLOCH, *Chansons D'Alpin*; WATSON, *Modern Commentaries on Hippocrates*; McCULLOCH, *L'Ambulantisme*; FISHER, *Incunabula Library of the College of Physicians, Phila.*; THOMSON, *Bones-Surgeon's Memories of Lister*; POWERS, *Oxford Physic Garden*; RISSMAN, *Rise and History of Clinical Teaching*; FITZ, *Napoleon's Camp at Boulogne*; QUINTELL, *Osler, the Mini-Kelly*; Osler, a Tribute; RUSSELL, *Osler's Influence on Medical Libraries in the U. S.*; YOUNG, *Aspirin's Hymn to Health*; GARRISON, *Osler's Contributions to Medical Literature*; Presentation to Sir William Osler on the Occasion of the 70th Anniversary of His

Birthday at Oxford; FOOTE, *Ancient Poems of Infant Sympy*; RUSSELL, *Walter Harris Moodie, New Observations in Pathology*; BURR, *Jean Paul Marat*; STOKES, *Graves at San Bernardino*; Appreciation of Henry Benson Jones; CUNNINGHAM, *The House of Felix Plater*; FRANKWILL, *William Paul Crillon Barre*; JONES, *Death of Robert Levet*; GARRISON and STRANDBERG, *Sculpture as Painting as Modes of Anatomical Illustration*; MONTGOMERY, *In Quintessence in Rabehais*; RUSSELL, *Thomas Fraser*; ROSSMAN, *Statements of Medical Interest from the Life of Celsus*; LAM, *Don Turner and the First Degree of M.D. Conferred in the English Colonies of North America*; ARBATT, *Isaac Semer*; HANSEN, *Latin Translation of Galen by Andrea Laguna, with Notes, Dedication, Life of Galen, Index*.

CONTENTS OF VOLUME THREE

WARREN, *Collection of the Boston Physiological Society*; CORRIE, *Ancient Egyptian Prescription for Hysteria*; JACOBI, *Elizabeth Fyfe, Pastor Fledder and Florence Nightingale*; HINDENBERG, *De Vinci as a Scientist*; WARR, *Sir William Osler*; GRANTHAM, *Shakespeare and Medicine*; PODOLSKY, *Amyro-Babylonian Twentieth on Diseases of the Male Genital and Genital Organs*; FRANKENWALD, *Gifts of Medical Degrees in the Middle Ages by Other than Academic Authority*; SKAVLEN, *Thomas Bartholin*; TAYLOR, *Montaigne and Medicine*; DANA, *A Great Consultation, Cordes Goes to Edinburgh*; Lines to a Skeleton; SURGER, *Unrecognized Anglo-Saxon Medical Text*; WOOD, *First Scientific Work on Spectacles*; MIDDLETON, *Charles Caldwell*; KELLY, *Lafayette Houghton Bunnell, Discoverer of the Yonkers Colwell*; Gideon Harvey, *Medical Life from the Restoration to the End of the 17th Century*; DOMEST, *Last Illness and*

Post-Mortem Examination of Malpighi; BROWN, *Christian John*; Care in the 16th Century; CUNNINGHAM, *Treatment of Trichiasis, with Reference to the Arabian School and Ali Ibn-El-Ain*; RUSSELL, *John Shaw*; GRANTHAM, *William Rawlin Beaman*; CORRIE, *Two Ideas of Anatomy*; BAYLE, *Library of Thomas Lorkyn*; GORDON, *Books of Nicholas Giffard*; RUSSELL, *John Ferriar Gaudes, Interpretation of Avicenna*; HARRIS, *Emetide, Mice and the Flies of I Samuel*; TURRELL, *Three Electrotherapists of the 18th Century*; WEAVER, *Marat and Graham*; CUNNINGHAM, *Treatment of Surgical Affections of the Lacrymal Apparatus*; WARREN, *Forerunners of Ophthalmology and the Nature Philosophers*; ROSENBLUM, *Thomas Holm*; Sir Moses Montefiore; ARBATT, *Erasmus Darwin, "Zoonia"*; MIDDLETON, *The John Kearney*; CORRIE, *Psychology of Medical Suture*.

CONTENTS OF VOLUME FOUR

FARRA, *Necrography in Modern Internal Medicine*; MIDDLETON, *Casper Winer, Jr.*; DA COSTA, *French School of Surgery in the Reign of Louis Philippe*; GIBSON, *London Surgery in the Early 19th Century*; RISSMAN, *Dublin Medical School, Its Influence on Medicine in America*; ROSENBLUM, *History of Pulse Timing*; John Eloyer and His Physician's Pulse Watch; VINTS, *De Staticis Experimentis* of Nicolaus Cusanus; PACKARD, *Guy Patin and the Medical Profession in Paris in the 17th Century*; WOOD, *Louis Daniel Beauprethuy*; Benjamin Franklin, *Inventor of Bifocal Spectacles*; McCRAE, *William and John Hunter*; TOCHART, *Richard Blackmore*; SMILEY, *Treatment of Convulsions (Tetany) with Calceum in the 17th Cen-*

tury; LEAKE, *Kappa Lambda*; DOCK, *Robert Talbot*; SHAW, *Madame de Svirgide*, and *Ciccho*; INGLE, *Regulating Physicians in Colonial Virginia*; CHANCOR, *English Worthies of Science of Interest to Ophthalmologists*; KAPPELBAAR, *Early History of Anatomy in the U. S.*; DOCK, *Early Observers of Albuminuria*; CORRIE, *Medical Major Wilson*; CADAMUS, *In Symbolism*; RUSSELL, *George Carter and the "English Malady"*; WICKHAMMER, *"Liber de Malignis Reperis" Attributed to Galen*; DANA, *Medicine and the Humanist*; DAVIDSON, *William Hoberden*; CHALFON, *Christopher Wilson*; CUNNINGHAM, *"Paedagogia" by Saint-Marthe*.

Published by PAUL B. HOEGER, INC., 76 FIFTH AVENUE, NEW YORK, N. Y.